



FRIDAY, FEBRUARY 1.

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Contributions.

Engines for Electric Lighting Plant.

DETROIT, Mich., Jan. 17, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of Jan. 11 an editorial stating that there was a demand for a perfectly balanced rotary engine for use in connection with electric dynamos on trains. I have patented such an engine, and built one of about 12 H. P., which machinists all said would not run at all, but which did run up to 500 revolutions per minute, without any other foundation than the plank floor of the shop, without the least vibration. You will greatly oblige me by advising me what size and what make of dynamo is in use for this purpose; what power is required, and number of revolutions of dynamo per minute; also what steam pressure is available, and any other information you may have on the subject, or advise me what roads are experimenting in that line, that I may get the information from them, so as to design an engine especially adapted to the work.

HENRY S. HOPPER.

HENRY S. HOPPER.

[To answer our correspondent's inquiry is a difficult matter on account of the limited experience which has, as yet, been obtained in lighting trains by electricity. However, we can probably give some general information on this point which will be of use. The size of dynamo now used is about 10 H. P. in connection with storage batteries. When used direct undoubtedly a larger amount of power will be required; probably 20 will be sufficient. The steam pressure available is about 100 to 120 pounds at the valve of the small engine. Compactness in design and a direct connection between the dynamo and the engine are necessary, and one should be careful to obtain the best possible insulation of the armature and fields. Care should also be taken to insulate all projecting parts subject to the influence of the current, in order to protect trainmen who may have to examine the dynamo in dark places with contracted surroundings. Further than this, care should be taken that all revolving parts are free from projections liable to catch in the clothing, such as set screws, etc. Trainmen in general are not accustomed to machinery. The commutator, if one be used, should be of the most serviceable character, and the electric of the machine should be so well balanced as to remove all danger from sparking and flashing, which would be liable to set fires in close quarters. The engine should be automatic and perfectly balanced, not "balanced" in the ordinary sense of the word, which suffices for engines on ordinary foundations, or even on wooden floors, but so balanced that when placed in a car, which is free to move in all direction, it will not produce a shaking motion of that end of the car in which it is placed. Such an equipment should take up the least possible room, and be so constructed that it can be covered with a plain iron casing so made as not to require a special wooden boxing. EDITOR RAILROAD GAZETTE.]

Station Agents and Their Instructors.

ST. LOUIS, Jan. 18, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The communication of W. W. Sylvester, and your remarks thereon, regarding the necessity which exists for the instruction of agents in their duties, examination of their methods, etc., by traveling accountants, or some specially designated officer, properly set forth some of the needs in that direction. I want to suggest that it would be well, also, to give the traveling accountants a few lessons in the details of a station agent's work, while it may sometimes be found profitable to extend the lessons to division superintendents.

The traveling accountant who is taken out of an auditor's office may know even less of the details of the agent's yard than the farmer boy knows of the details of the agent's office.

As to the division superintendent, I can best illustrate my point by stating what I heard when a bright agent at a junction point unburdened himself to me a short time ago as to a visit he had had from one just appointed over him. The agent was bright and quick, had been advanced for merit, and was keeping himself informed of the probable shipments of grain, tobacco and other products he might expect to receive for the line from the surrounding country, and taking an active interest in all industries likely to benefit his road. The new superintendent came from a different field. One day he stepped from a passenger train, looked about the station and the half mile of yard, which was through the main street of the village, and after introducing himself, began a discussion of—what do you suppose? Crops, past or prospective? Lime or ore shipments? Business? No, sir! He raised a row because the paper which had blown under cars and between the ties from the sweepings of the stores on the main street had not been gathered out of sight. Not a word of praise for the clean station and platform, though the agent's force was small. Not a suggestion promotive of economy, of progress, or for expediting business, but a scolding for the agent for what might have been the neglect of the section foreman. I saw the agent a few weeks later. He had had another visit, differing only in degree. A little while longer and he found a place on another line.

This was on a large system, which needs good men. Here it lost one. That official still remains, though in a different capacity. Would not a little training have been a good thing for him? Would it not even have been a good thing to give some slight attention to the man who selected the division superintendent?

S. D. W.

The New York Commissioners and the Rome, Watertown & Ogdensburg.

OFFICE OF THE BOARD OF RAILROAD COMMISSIONERS,
ALBANY, Jan. 28, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A letter from "J. M. E.," dated Jan. 18, 1889, published conspicuously on the first page of your issue of Jan. 25, so misstates the facts and law in reference to the late decision of the Board of Railroad Commissioners of this state in the case of the Watertown banks against the Rome, Watertown & Ogdensburg Railroad, that I feel constrained to send you this communication.

I was somewhat surprised to see such a letter printed in your journal in the absence of the publication of the decision itself, wherein the reasons for the recommendation are given in full. Probably, however, had you seen the decision you would not have printed the letter.

First, as to the facts—Your correspondent says that "three banks of Watertown made a complaint to the Railroad Commissioners asking that the Rome, Watertown & Ogdensburg be compelled to run a train at an earlier hour from Utica or Rome to Watertown, in order that the mail might reach Watertown earlier in the morning."

The complainants, so far from being limited to "three banks of Watertown," consisted in addition thereto, of 430 residents of Watertown, 188 of Ogdensburg, and 44 of Gouverneur, comprising the leading bankers, merchants, manufacturers and farmers of those localities.

A public hearing very largely attended was held before a Commissioner in Watertown in July, at which desire was unanimously expressed for an earlier train, no one present expressing satisfaction with the present time-table. It is proper to say that the recommendation of the Board to start the trains from Utica and Rome at about five o'clock in the morning was simply to restore the time-table which had been in operation for many years, and with regard to which no complaint ever reached the Board. The present time-table, about which so much complaint is made, has only been in operation about two years or less, and since the lease of the Utica & Black River to the Rome, Watertown & Ogdensburg. The remonstrances of the company to the recommendation of the Board were carefully considered, but were found to be outweighed by the advantages resulting from the earlier morning train.

The Board believes that citizens of Rome and Utica prefer to start at this early morning hour and thus be enabled to transact business on the line of the railroad and return the same evening, which under the present time-table they are in many cases unable to do. The inconvenience to passengers in the sleeper remaining at Utica a couple of hours in hearing of the passing trains did not appear to be a very serious one at the hearing. A large proportion of the hotels of the country where passengers spend the night are subject to the same inconvenience. The inconvenience to passengers from the south and west of New York City and from New England, and the alleged loss of revenue from competitive business, seems to have been an afterthought to the authorities of the railroad, for the reason that the company voluntarily offered to start the trains from Rome and Utica at about 5 o'clock in the morning provided the New York Central would haul the R., W. & O. sleeper upon the train leaving New York City at 9 p. m. This the New York Central declined to do, for the reason that the 9 p. m. train was exclusively a mail train, and did not make connection with passenger trains anywhere, and a sleeper attached thereto would delay its progress. No passenger would be inconvenienced by taking the train leaving New York City at 6:30 p. m. who would not be equally inconvenienced by taking the train leaving at 9 p. m.

Second, with regard to the law.—The law covering the

subject is to be found in Section 17, Chapter 215, of the laws of 1846, and Section 34, of Chapter 140, laws of 1850. In a word, the law provides that the post-office department of the general government may contract with railroad companies to carry the mails on their regular passenger trains for a compensation to be agreed upon, or, in case of disagreement between the railroad companies and the post-office authorities, for the appointment of commissioners to determine the compensation. If the post-office department requires that the mails shall be carried at other hours than the regular passenger trains, or at higher speeds, then, and in such case, "the corporation shall furnish an extra train for the mails and be allowed an extra compensation for the expense and wear and tear thereof, and for the service to be fixed as aforesaid."

The Post-office Department had been applied to by the complainants in this case but declined making an agreement for a special train for the reason that the weight of mail on that route did not justify the Department in contracting for such service, but if it did "there are no means available to pay for it." From the letter from the Post-office Department the following extract is made: "The complaint is well founded because the mails from New York arrive at Utica at 4:14 a. m. and are held there until 7:30 a. m. awaiting the departure of the train on the Rome, Watertown & Ogdensburg Railroad, thus occasioning a delay which makes the Watertown mail arrive at too late an hour to admit of reply to business correspondence on the same day."

The post-office authorities under the state of facts existing on this road have no authority to provide a special train or to change the time-table of the present trains.

The only jurisdiction under which the running of such trains comes is that of this Board. The Board has exercised such powers as it possesses after careful consideration and to the best of its judgment, and, it believes, in accordance with the overwhelming sentiment of those using the road, and without likelihood of detriment to the pecuniary interests of the stockholders thereof.

The temper and fair-mindedness of your correspondent may be, perhaps, best understood by quoting a sentence of his letter, to wit: "If they get their wishes here, they would then expect the earth to be inclosed with a gold fence and a first mortgage upon it at once executed in their favor."

WM. E. ROGERS,

Chairman of the Board of Railroad Commissioners.

[We should not have published the letter, the appearance of which surprised Commissioner Rogers, had we not thought that there was much reasonableness in it. It is quite evident that by running a train out of Utica about 5 o'clock a. m., the Rome, Watertown & Ogdensburg would accommodate many people in the region which it serves better than by a later train. It is also quite evident that by starting its trains northward some two hours later it better accommodates many of its patrons. By running trains at both hours it would please both classes. But it is not apparent that the road can afford to increase its winter train service. If, then, the road cannot afford to run more trains than it now runs, the question is whether the public is better served by the present time-table than it would be by that proposed by the Commissioners. In considering this question, it is a fair presumption that the railroad has arranged its train schedules after careful study and as the result of long experience, with sole regard to the greatest public convenience. It is hard to see any reason for doing otherwise, and the reasons for so doing are sufficiently apparent to any one who does not look upon railroad companies as the natural enemies of society. This general proposition seems to us to be borne out by such facts as we have seen bearing on this particular case. The letter of "J. M. E." specified the inconveniences which would be caused to through passengers from the East and West by the earlier departure of trains from Utica and Syracuse. But the inconvenience which the proposed change would cause to local passengers from Utica, Rome and Syracuse and from intermediate stations north of those cities is not mentioned, and this, we judge, is really the most important consideration of all. There is a great difference in comfort between a train leaving at 5 o'clock on a winter morning and one leaving at 7:30. It will be noticed that the petitions asking the change are all from Watertown and points further north. Giving all due weight to the 662 names signed to these petitions, we are inclined to think that they do not represent the majority of the patrons of the road, and that many more names could have been obtained in Rome, Utica, Syracuse and the way stations. If, indeed, the Board is correct in its assumption that the residents of the last named cities prefer to get up in time to catch a 5 o'clock train when setting out on a journey northward, then the road has perhaps made an error of judgment of greater or less magnitude. But this is only "belief," and even if true, the way stations whose entire business has to be done over this road may not have been sufficiently considered. Being less able to turn themselves in unfavorable circumstances, their interests really ought to be given more weight than those of

the same number of persons more advantageously situated.

It should be said further that the statement of the Commissioner that the recommendation of the Board was "simply to restore the time-table which had been in operation for many years," and the implication that the change was consequent upon the lease of the Utica & Black River, are both rather unfair. No train has left Rome earlier than 6 a. m. for nine years. The lease was made March, 1886. Trains were run from Rome at from 6 to 6:10 a. m. and from Utica at from 5:15 to 6 a. m. until the autumn of 1887. The change was made when the New York Central train No. 9 was changed to leave New York at 11:30 p. m. instead of 9:15. Of course, in discussing this one question, we have said nothing about other complaints made by citizens of Watertown, which may be more just.—EDITOR RAILROAD GAZETTE.]

Two Recent Rail Sections.

We show in this issue two rail sections, lately designed and adopted for the Union Pacific and for the "Plant" lines. Both sections are heavier than those formerly used by those roads. The Union Pacific has been using a 67-lb. rail on heavy grades, and 60-lb. on other portions of the lines. A 52-lb. rail has been used to some extent on branches. Nothing lighter than 60 lbs. has been bought during 1888, and nothing lighter will hereafter be used. The 75-lb. section has a head relatively thin and broad, and a 12-in. radius for the crown. The proportion of the metal in the head is, however, not as small as in some other recent sections, and the height and base are less. Comparative figures are given below. With a less weight of metal the Plant rail has a greater height and width of base, the section being lighter in all of its proportions.

The joint used with the Union Pacific rail is also shown, and the dimensions are sufficiently given in the illustration. The angle bars are 40 in. long and weigh 70 lbs. per pair. The section, it will be noticed, is the Fritz-Sayre type. The Verona washer used with this joint is $\frac{5}{8}$ in. wide. For the last three years 36-in. splices have been used for all new rail with a tie at the joint. Joints have usually been laid square, but broken joints may hereafter be used in renewals on ballasted track. Ties are laid 17 to a pair of rails, or 2,992 per mile of track.

For the drawings and information we are indebted to Mr. V. G. Bogue, Chief Engineer.

The other section shown is from the office of Mr. W. B. W. Howe, Jr., Chief Engineer Savannah, Florida & Western, etc. Concerning the reasons which governed in the design of this section, we reprint some of the remarks of Colonel Haines, the General Manager, published in our issue of Jan. 18, in the discussion on rails.

"What is wanted in the way of a rail for a rock-ballasted road is not what we want in our territory where, for instance, in 1,000 miles of road in our system there is not one mile of rock or gravel ballast or any probability of obtaining it. When we first began to use steel rail, its cost being so excessive as compared with iron rails led us to use a light section, that is, 50-lb. As our equipment and trainloads increased in weight, we have replaced it in a great measure with a 60-lb. section. On taking up the 50-lb. rails, we found them bowed at each end as if the base had become lengthened under the rolling of the trains, and yet very little wear on the heads. For instance, in taking up a number of rails near Savannah, where our traffic was the heaviest and where they had been down 10 years, we found a loss by wear of about 3 lbs. per rail of 30 ft. * * * The trouble with us is not the wear of the head but the bending upward of the rails at the ends, which would seem to show that rock-ballast will wear off the head of a rail faster than it would wear on an unballasted road, and that in designing a heavier section for our sandy road-beds we do not need so much metal in the head of the rail, but we must seek to make the rail higher and perhaps broader. With that end in view we have recently designed a section of a 70-lb. pattern, 5 in. high, and with a base of 5 in., using the same metal in the head that we now use in our 60-lb. rail; that is to say, we are providing for increased stiffness and not for increased wear."

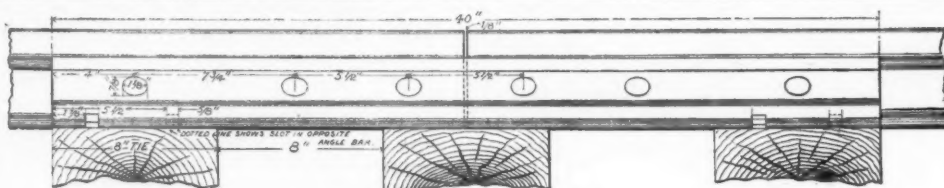
It will be of interest, no doubt, to compare these rails with other sections of comparatively recent design, as to distribution of metal and principal dimensions.

	E. F. & W.	Union Pac.	Bending	Milb. Cent.	P. R. R.	N. Y. Cent.
Weight per yard	70 lbs.	75 lbs.	90 lbs.	80 lbs.	85 lbs.	80 lbs.
Per cent of metal, head	45.05	46	49	42.36	47	44
" " web	19.29	18	19	20.92	17	19
" " flange	35.75	36	32	36.72	35	37
Height	5	4 $\frac{1}{2}$	5	5	5	5
Base	5	4 $\frac{1}{2}$	5	5	5	5
Radius of crown	19	12	12	12	10	12
" " corner	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	7-16	5-16

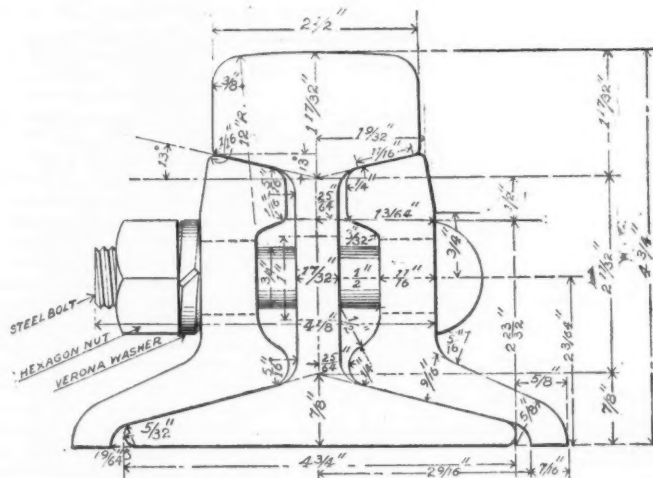
The Essential Elements of Steam Heating.

There are three essential elements in the steam heating of a train, all the other matters being secondary and such as may be determined for each particular case. These essential elements are the coupling, the drainage of pipes and the trap. By drainage of pipes, I mean the coupling of the pipes in

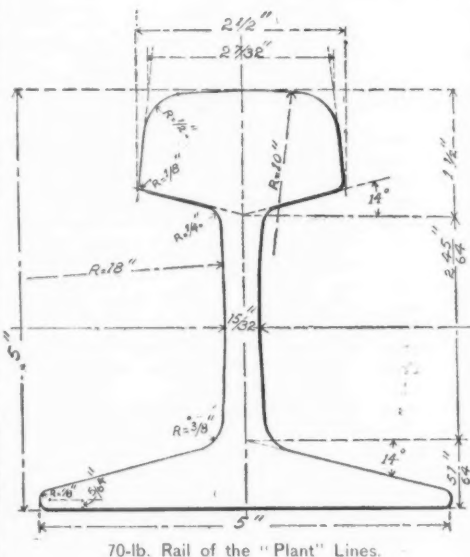
*Abstract of a paper by Mr. W. L. Johnson, before the Western Railway Club, Jan. 13, 1899.



Angle Splice Joint—Union Pacific.



75-lb. Rail of the Union Pacific.



70-lb. Rail of the "Plant" Lines.

such a way that the water of condensation shall seek the lowest point without interference by obstacles.

As to the coupling, we will all agree that the primary necessity in the case is that it shall be steam-tight. It is better to join two cars with a hose and unions which require the use of a monkey wrench, although they are inconvenient to connect and to disconnect and will break when the train parts, than it is to use any other arrangement that is more convenient and less reliable. Aside from being perfectly steam-tight, the most essential thing in a coupling is that it should have but one joint. As long as a coupling can be made which has but one joint, there is no object in using a coupling which has more.

The second essential element is drainage. The heating system on a car is not a circulatory system and I do not believe that it can be made so. All condensation must fall to a trap and from the trap it must be wasted. It was learned many years ago that no steam heating system could be successful, especially a low-pressure system, unless all the pipes were free from pockets. That is, there must be a continuous and gradual descent from the point where the steam enters the system to the point at which the water of condensation leaves it. It is possible with high-pressure steam to force the water of condensation along pipes and up over bends. With low-pressure heating it is not possible and in either case it is very poor practice, indeed. Any method of piping a car which necessitates the water of condensation passing over obstacles is incorrect both theoretically and practically. This applies not only to the piping within the car but to the connections between the cars. As the cars of a train are seldom kept in the same order, and are liable to be turned end for end, it is evident there is no such thing as having a continuously descending pipe from the tender backward. It follows that the supply pipe of each car must have a local drainage in such a way that the steam enters at the highest point, and the water of condensation is relieved at the lowest. In order that the car may be symmetrical in its pipe arrangements, this lowest point in the train pipe must be somewhere near the center of the car. At such point there must be a trap.

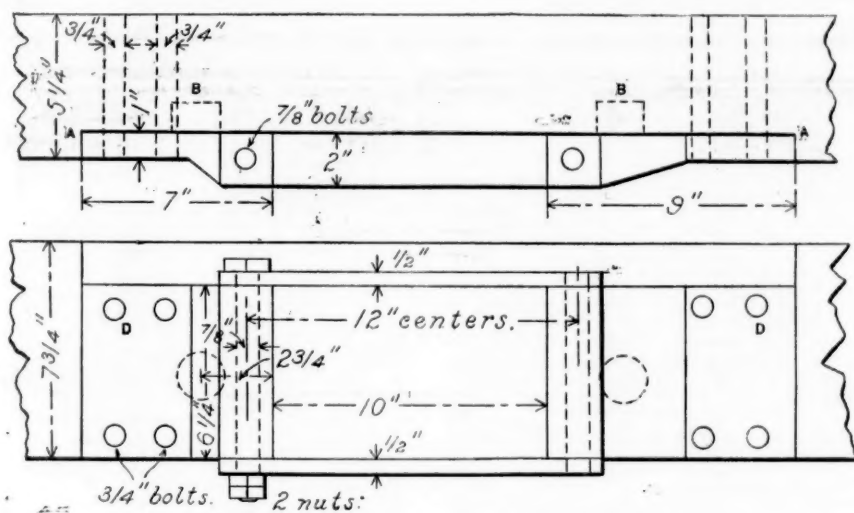
I have seen cars heated with steam where the train pipe had no trap whatever, but all the water of condensation was forced along until an opening was found upward into the heating pipes, thence the water was forced by the steam through the heating pipes and finally out through a trap. In some cases the water is blown out at the end of the train. That method of piping a car is about as crude as could possibly be devised, and would never be installed by a heating engineer. If the train pipe cannot be arranged overhead to drain downward through the heating pipes, it should have a trap at the lowest point in the car. The question of whether one or two traps should be used is only one of arrangement, but certain it is that the train pipe

must be kept perfectly dry and free from condensation without forcing the condensation upwards through the heating pipes. The same rule of having the dry steam enter at a high point and the water of condensation flow out at a low point must be considered in the heating pipes of a car, as well as in the train pipe which supplies them with steam. So long as this rule is observed, it makes practically little difference how the pipe runs in the car. The only essential consideration is that there be heating surface enough to produce a temperature of 70 deg. in the coldest weather. Practically, there must be about 200 sq. ft. of heating surface, which is, in steam heating parlance, in the neighborhood of 1 to 25.

All that I can see that is patentable regarding car heating is the form of coupling, form of valve, form of trap or some particular combination of steam heating and water heating.

If the pipes of the car are so run as to give perfect drainage, the next desideratum is that there shall be as few valves as possible to operate. I have heard of a system used where there are as many as 11 valves in one car. Aside from the valves at the end of the train pipe, which prevent the steam blowing out at the back end of the train, the greatest number of valves that can possibly be needed on a car is two. And it is possible to pipe the car in a way that one valve will be all that is necessary to control the steam for the car. If the train pipe lies underneath, it is not necessary that the steam pass in at one valve and out at another, as the piping may be arranged on what is called the "single pipe system," which is used in at least two-thirds of all the buildings in the Northwest. This method of piping gives excellent results if not too great an amount of radiation is placed on one pipe. That is to say, no more than 48 ft. should be supplied by an inch and a quarter valve; no more than 80 ft. by an inch and a half valve, and any number of square feet of radiation greater than 80 ft. should have not less than a 2-in. valve if a single pipe system is used. One great mistake in all experimenting with steam heating on trains has been to use too small pipes. In no case should the train pipe be less than an inch and a half in diameter, and 2 in. is none too large, providing it is thoroughly insulated, so as not to waste the steam by radiation. The latest method of running steam pipes in a building is called the overhead system. This is used in many of the finest buildings in Chicago and the Northwest. By this method of heating the steam is taken directly to the top of the building and there distributed, and the steam, instead of passing up through the risers, passes downward, so that the water of condensation instead of opposing the passage of the steam, as is the case with an underneath system, flows in the same direction as the steam. This method of piping has been found very satisfactory, as it produces very dry steam courses. This method of piping has been used on railway trains with great satisfaction. It is the present method of piping used on the Chicago, Milwaukee & St. Paul. The train pipe passes through the coaches near the roof or over the roofs of the coaches. Being in that position the steam is always dry, all of the condensation falling directly through the heating system to the trap. It is my opinion that when all have experimented to their heart's content, they will adopt the overhead train pipe. It would seem to a person who has not seen it, that it would be awkward, cumbersome and unsightly, but such is not the case. It is possible to run a train pipe underneath and have it as efficient as an overhead train pipe, but the drainage must be perfect and the couplings must not sag.

My final consideration is the trap. All forms of expansion traps are old and have never been completely successful in stationary steam heating. In fact, expansion traps were given up years ago as a failure. If they have been a failure in house heating, much more will they be a failure in car heating, because the conditions under which they are placed are much more trying. It will not be necessary to enumerate the various reasons why the expansion trap is not a success, because they are many. The failure is inherent and cannot be avoided. As a trap for steam heated trains they would be a failure from one cause alone, if there were not abundant other causes for their deficiency, and that is they are a "constant" trap, using the term in contradistinction to an "intermittent" trap. That is instead of accumulating a certain amount of the water condensation and then discharging it periodically, to use a common expression, they "drizzle." As the amount of condensation in any one car after the pipes are heated up is quite small, the "drizzling" of a trap causes it to freeze in very cold weather, especially if the valves should be shut off tightly in the car so as to produce a partial vacuum. Many attempts are being made to make an expansion trap which will have a greater opening and greater motion under variations of temperature, but there is nothing new in this form of trap, as all forms of multiplication of levers for the purpose have been used heretofore. The greater the movement in opening and shutting the greater the liability



DRAW BAR STOPS—CHICAGO & NORTHWESTERN.

ity of the trap to get out of adjustment, and, in case dirt gets in the seat of the trap, the greater the liability to disarrange the apparatus. If an intermittent float trap could be arranged on a car so that the motion of the train would not affect it, and the liability of water being left in it when the car is out of service could be avoided, I believe it would be quite reliable. A float trap is being experimented with in St. Paul which has a secondary valve preventing the water remaining in the trap when the car is out of service. As I recollect it, though, the float works constantly instead of intermittently, and thus would drizzle like an expansion trap. I am quite inclined to believe that an overbalancing trap which works on the plan of some water meters, might be of service if properly constructed. An electrically actuated trap has been running on the Chicago, Milwaukee & St. Paul nearly a year now. This trap discharges periodically, the valve being opened and shut by compressed air governed by electricity. It opens when the temperature of the water falls to about 130 and closes when steam enters the trap. Since finally regulated, a year ago the coming February, this valve has operated without any attention whatever. It discharges in about the same way as a periodic float trap, but avoids the difficulty which arises from the movement of the car and the liability of water remaining in the trap when the car is out of service, as the valves open in all cases when the water falls to 130 F.

In conclusion, I would say that I believe, when all have experimented until they have removed the keen edge of their inventive desires, steam heating of railway trains will be a very simple affair; that many of the contrivances now being used will be discarded and that we shall come down to plain pipes with plain valves and as few of both as possible. Couplings will be so arranged that they will not pocket water; train pipes will be drained at least in one point in every car. Expansion traps will be discarded and some form of the periodic trap will be substituted in their place. There is no reason why trains should not be steam heated without any annoyances. There is no reason why a train when coupled up in the yards should not make the complete trip without any attention to the steam heating whatever. There is no reason why a coupling cannot be steam tight for weeks or months without attention. There is no reason why a trap cannot be made that needs no adjustment from day to day, nor from month to month. Unless a system of steam heating is as complete as the above, it cannot in the long run be successful. Any system of heating that needs to be babied or tinkered with every day or every week cannot be a success. Instead of adding to the duties of the trainmen, the adoption of steam heating should reduce their duties, as it should work automatically and relieve them from the attention which they usually give to the stove.

DISCUSSION.

In the discussion on steam-heating for trains, Mr. Martin said: It is practical to run the main pipe in a car, with the highest point at the centre, without a trap, and there will be no half gallon more water at the sixth car than at the first. Men question why this is so. There is in steam a large amount of latent heat, and as it passes along, the latent heat will continue to reveal itself. If you take a train of ten cars and suddenly break a coupling, you will not get a teacupful of water. I insist that when cars are out of service they shall always be uncoupled because of liability to freeze. The New York Central lets trains stand without uncoupling, experience showing it to be unnecessary if the train is going out solid the next morning.

Mr. SCHROYER: I am surprised that Mr. Martin admits steam into the car and discharges the water of condensation without letting it back into the main pipe. I think a car should be piped so that the condensation will flow toward a certain point, but I find it difficult to get sufficient inclination. We use live steam; in certain points condensation takes place rapidly, and the heat is unequally distributed. It might be replied that this could be overcome by taking out, or adding pipes, but we cannot do that. If we take out some of the piping there will not be enough when the emergency heater is used. I deem it essential to put along the truss plank a 2 in. pipe inclining toward a certain point; this, however, heats the sides uncomfortably, while persons sitting next the aisle do not get enough heat. If the trainman opens the blow-off there is no trouble from condensation. We are having moderate success with cars fitted with the Baker pipes. With other cars live steam should be used.

Mr. TURREFF heats cars in yards from a stationary boiler. Mr. SCHROYER referred to the large number of terminal stations on his road, and considered boilers for their yards out of the question.

Mr. MARTIN: The New York Central at — heats its own cars and those of the West Shore and Boston & Albany, from the boiler which heats the building.

Mr. SMITH: The Old Colony uses an old locomotive, otherwise useless, for heating cars in the yards.

Mr. SETCHELL: Five lbs. pressure is enough to heat cars with the thermometer at 20 deg. below; cars have been successfully heated with hot water. Steam, at any pressure, is hotter than water.

Mr. SCHROYER: Cars with enough piping for the coldest weather are too warm in moderate weather; low pressure is not of much consequence; 10 or 15 lbs. is all right.

Mr. Rhodes: Hot water is more dangerous than steam.

steam under 50 lbs. pressure might all escape without scalding, where hot water would injure many people.

Mr. RHODES: Excessive heat in mild weather is a difficulty common to all systems. Even with a porter who has nothing else to do passengers complain. This being the case what are we to do where the trainmen have other duties to perform?

Mr. MARTIN: An automatic pressure regulator is necessary, and will probably meet the case.

Draw Timbers and Draw-Bar Stops.

The accompanying cut shows the new method of arranging the draw timbers and draw-bar stops now being used on the Chicago & Northwestern freight cars. This arrangement differs from the ordinary arrangement by having a larger bearing against the wood, which renders the stops less liable to become loose. The draw timbers are securely bolted to the centre sills and keyed thereto with three iron keys to each draw timber. The additional area of bearing is obtained by recessing the draw-bar stops into the timbers their full depth, as shown at A. There are also large bosses, shown at B, which are recessed into the wood to obtain additional bearing. These draw-bar stops are securely bolted by four bolts, instead of three as usual, as shown at D. At one end the draw-bar stop is longer than at the other. The purpose of this is to enable this form to replace the old arrangement of draw-bar stops without cutting the timbers. This arrangement has been in use for some time, and excellent results have been obtained therefrom. Further description is unnecessary, as the dimensions and the cut explain themselves.

Dockstad's Continuous Lock Rail Joint.

The rail joint illustrated herewith is of the chair type and is designed to do away with holes through web of rails.

Fig. 1 is a perspective view of the chair, which is spiked to the tie through the slots g. The arms B' are made to con-

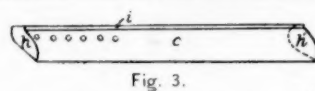
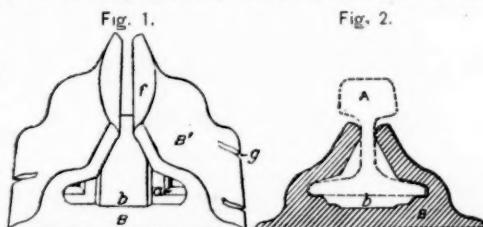


Fig. 3.

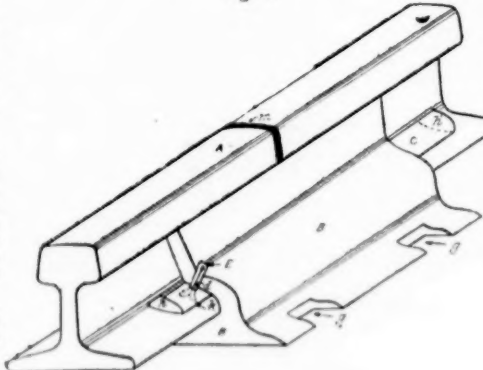


Fig. 4.

form as nearly as possible to the outline of the rail, and are of sufficient height to engage the tops f, closely under the rail head. The arms are also made thicker in the middle in order to increase their strength.

On the upper surface of chair base B are four lugs a to prevent creeping of the rails. The lugs fit into slots cut in the flange of the rail, which are large enough to allow for

expansion and contraction. In the middle of the chair base is a channel b, the object of which is to distribute the strains more equally through all parts of the joint.

The lower inner surfaces of the arms B' are shaped to conform to the locking wedge C, which is thicker at one end than at the other; and as the locking wedges on the two sides of the joint are driven in from opposite directions, their bearings in the chair are correspondingly inclined.

Fig. 2 is a section of the rail joint through two of the opposite lugs a, showing the manner of introducing the rail, which is slipped in above the lugs until the slots in the rail flange allow it to drop to its bearing on the chair base.

Fig. 3 is a perspective view of the wedge C, which is wedge-shaped lengthwise and crosswise, as shown by the ends h, h'. It has a rib f along its upper edge, which acts as a guide in driving it into position. At the smaller end of this wedge are a series of holes d, which increase in size towards the bottom. A split key E, fig. 4, is inserted into one of these holes to prevent the wedge from slipping back when it is in position.

Fig. 4 is a perspective view of the joint, complete.

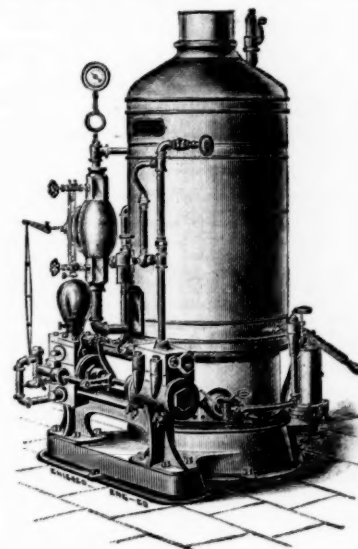
The inventor of this joint claims as its especial merits that the rail is securely locked against motion in any direction except longitudinally, and that the joint is as strong as the rail. It is also thought to very effectively prevent creeping.

Several of these joints have been in the track of the Atchison, Topeka & Santa Fe from three to six months, on curves and on a grade where much trouble has been experienced from rail creeping. The trackmen speak very highly of its performance there.

Further information can be obtained from Mr. P. C. Dockstad, Colorado Springs, Colorado.

Automatic Steam Pump Using Oil Fuel.

The Racine Hardware Co., of Racine, Wis., has completed and put into service a number of automatic oil fuel engines and boilers, with steam pumping outfits, for service at water tanks on western roads. The details of the device are very ingenious, and the operation thereof is very simple. The small space required and the rapidity with which it can be put into service, together with the ease with which it is operated, has rendered it particularly applicable for railroad work. It is in use on several roads in the West.



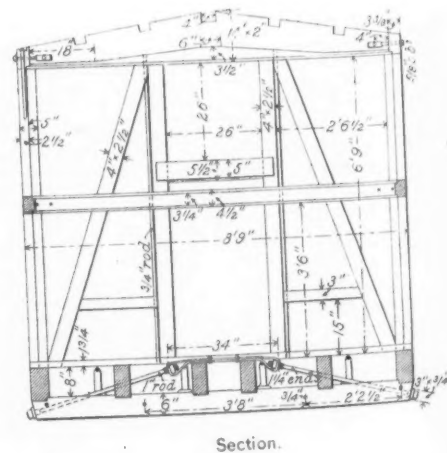
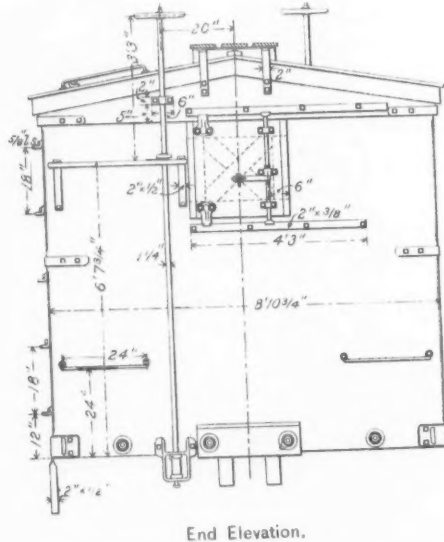
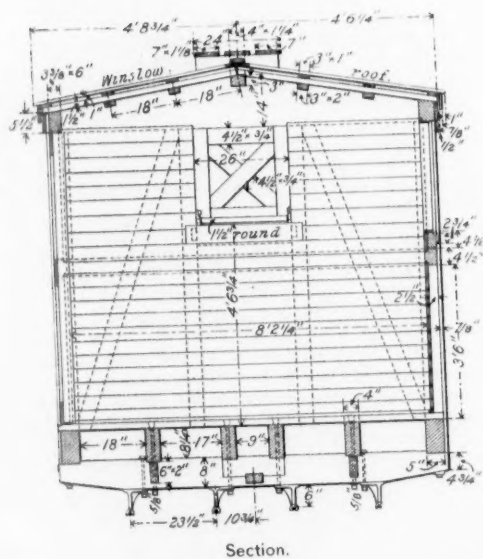
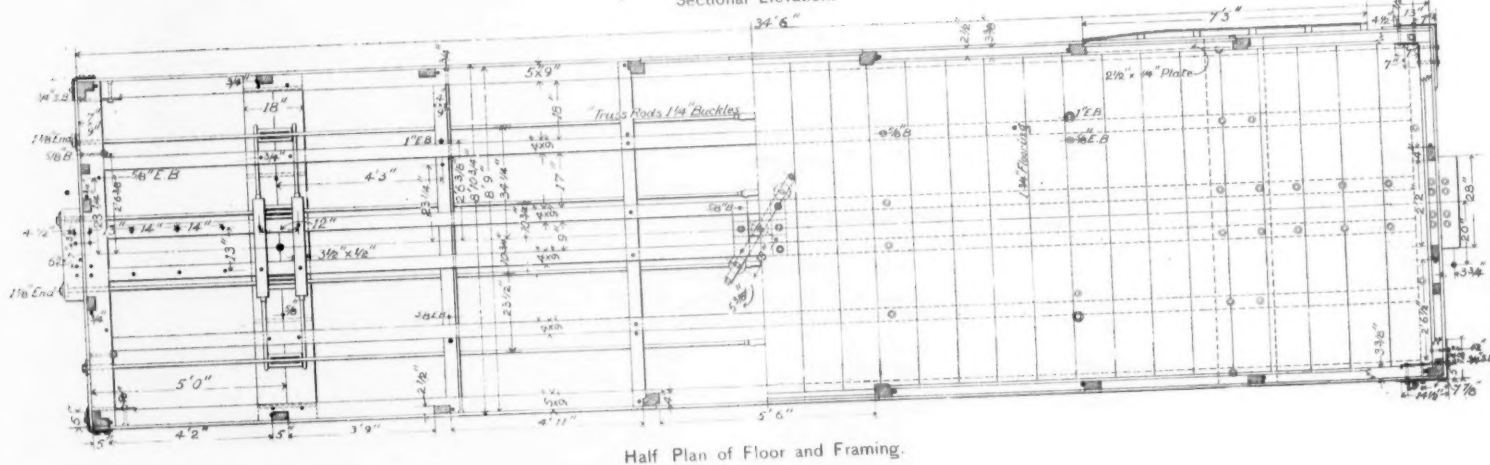
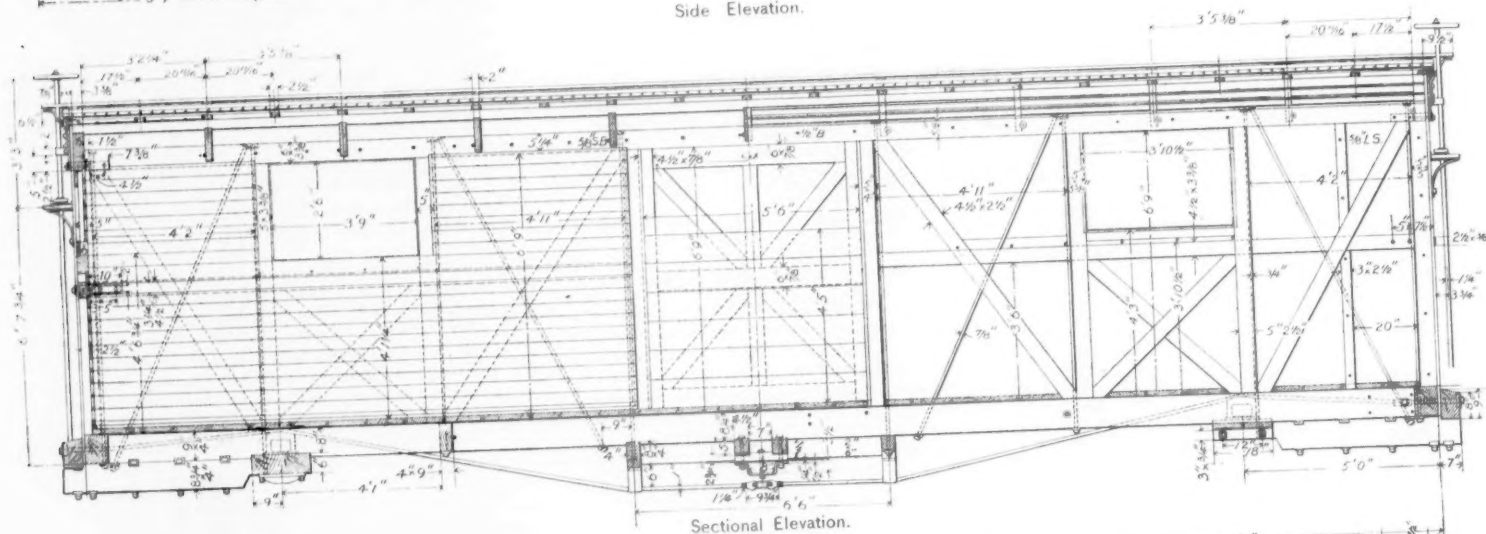
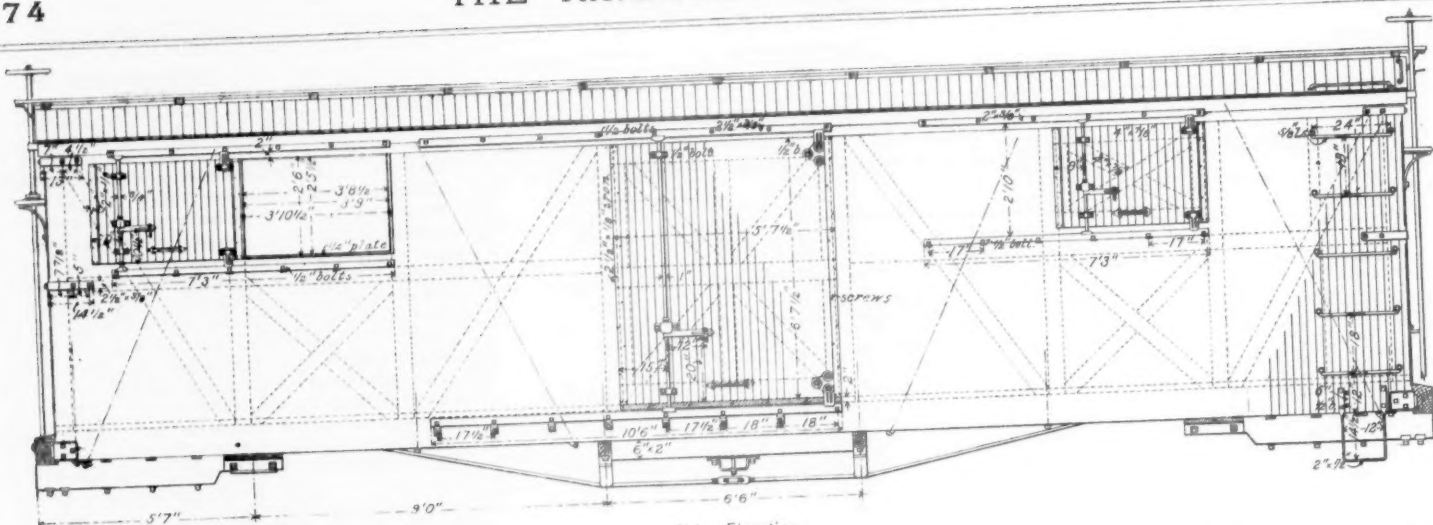
The accompanying cut shows the general design of the apparatus. The special features claimed for this pump are great compactness, reasonable cost, simplicity of construction and automatic action. When the pump is once started, which can be done in about eight minutes, it can be left to itself for the remainder of the day. These pumps are made in sizes to deliver from 300 to 500 gallons per hour. The smallest size weighs 300 lbs., and occupies a floor space of 20 x 22 in.

The oil fuel used is crude petroleum. The boilers are tested at 300 lbs. per sq. in., and are constructed to meet the government rules for marine service. These boilers are of the "Porcupine" type, so called, having radiating tubes. The feed water utilizes some of the heat of the exhaust steam, and delivers the water to the boiler at about 212 degrees Fahrenheit. A pump is used to fill the boiler, and an air pump assists in starting the fire. There is a demand for this class of pumps for intermittent use, and many attempts have been made to use oil as a fuel, its value arising from the possibility of an automatic firing apparatus which will not need the assistance of a fireman for a period of several hours.

30-Ton Combination Car.

The 30-ton car and truck which are shown in the accompanying illustrations are thus described by Mr. William Garstang, Superintendent of Motive Power, Chesapeake & Ohio:

The car was designed to fill a want long felt on the Chesapeake & Ohio. We ship coal in large quantities from Virginia and West Virginia, to points as far west as Chicago, and to have to return these cars empty that distance, causes a great loss to all parties handling them, as was the case with the plain gondola, a large number of which we put in that trade. After considerable attention was given



THIRTY-TON COMBINATION CAR—CHESAPEAKE & OHIO RAILWAY.

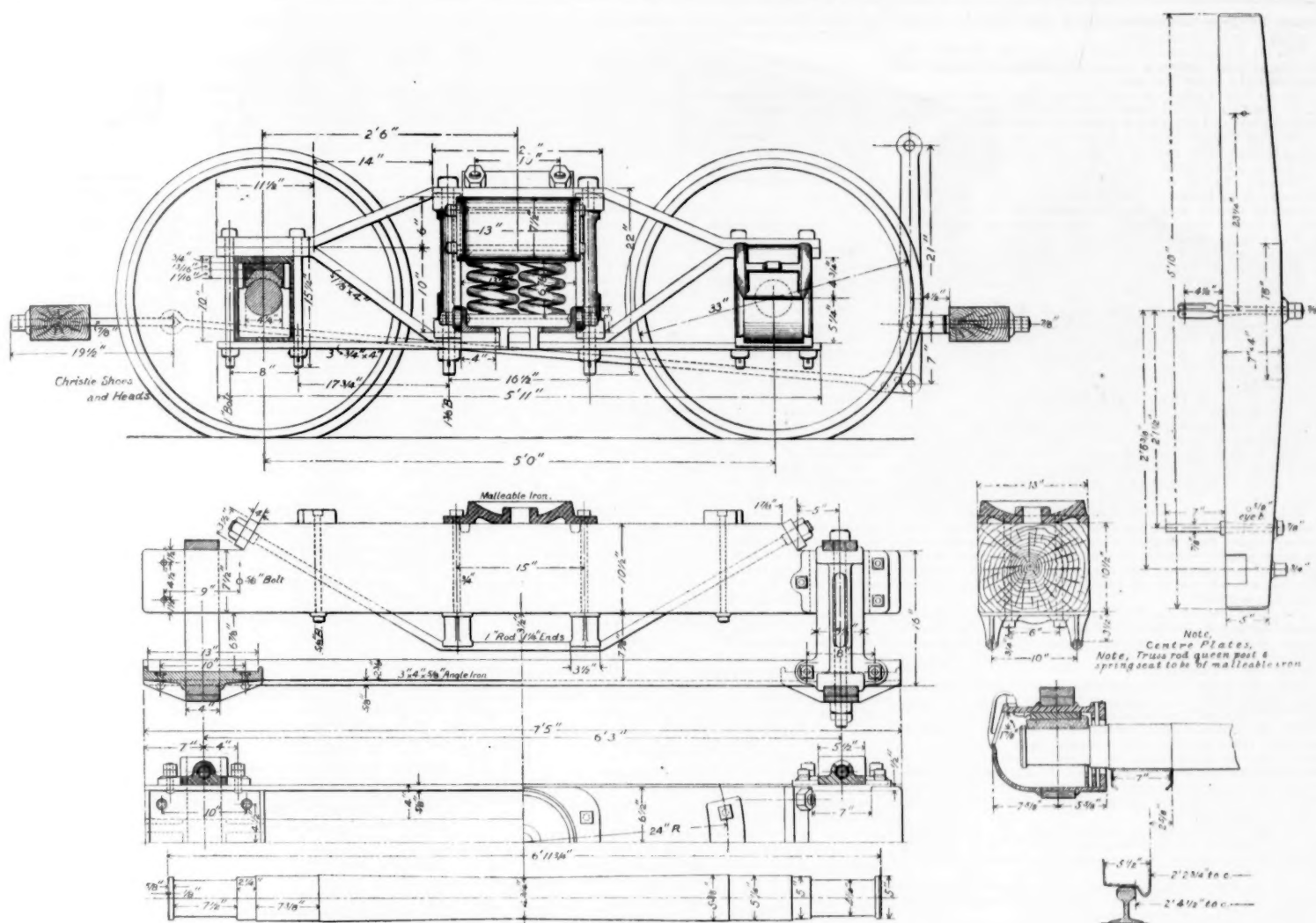
the matter, a car was designed that could be readily loaded at our chutes (through the coal doors), sent west with coal and returned east with grain or merchandise, without danger of damage by water. One will readily see by the drawings the style of framing, doors, etc., adopted to accomplish this.

The door sills are framed in solid, coming flush with the

outside and rabbeted on a bevel on the bottom to receive the siding, and using a flush door. The car is lined on the inside to the roof, so that it can be easily swept out after being loaded with coal. We also had to change our grain door, as no slide door can be used in connection with coal or coke. The door we have adopted is known as the Jackson patent, and opens out from the car, freeing itself under all circum-

stances. The door is attached to the car body by a strong chain to prevent its being lost. The car is made strong and heavy to stand the service it will be placed in.

The truck is thus described:
The arch bars are $1\frac{1}{2} \times 4$ in.; tie bars, $\frac{3}{4} \times 4$ in.; journals, $4\frac{1}{4} \times 7\frac{1}{2}$ in. The top bolsters are made heavy and trussed with a double malleable iron queen post which has



THIRTY-TON FREIGHT CAR TRUCK—CHESAPEAKE & OHIO RAILWAY

given better results than the single queen post in the centre of the bolster. No bottom bolster is used, but in its place two 3 x 4-in. angle irons used as spreaders. The spring seat is of malleable iron and riveted to them. The 4¼ x 7½-in. journal was used because it can be used in our standard journal box and will not necessitate scrapping the axle when worn too small for 30 ton cars, but can be readily used under cars of a smaller capacity.

Mr. Garstang also sends drawings and description of a tide-water coal car, which is not illustrated. This car was designed for another class of coal trade, which for success requires an easy manner of loading at the mines and quick unloading at the port chutes directly into the vessel. The style of hopper car generally used in this trade is flat on both ends, and requires about 20 minutes for unloading, while this car is readily unladen of 30 tons of coal in $1\frac{1}{2}$ minutes, and requires only one-half the number of men to handle it. It has double doors, which make a wider opening than some of our chutes have; therefore we use a check chain on the end doors that allows the centre doors to fall to the perpendicular, and keeps the end doors up to the incline of the hopper. When dumping over a trestle or wide chutes these chains are unhooked, which, of course, allows the car to unload still quicker. There is always trouble with any coal car having the winding chains on the inside, and especially in winter, when the snow and rain freeze the coal hard. I have often seen men have to dig the coal all out before the doors would drop. The winding shaft is put through a pipe which is screwed into the bearing castings on the side sills, and they are bolted to the sides of the car. The sheave wheels and hopper chains, coming on the outside, leave the door rigging free, and no matter what the condition of the coal, the doors will always drop readily. Another advantage is that the chain only passes around the sheave wheel once, which leaves no opportunity to bunch and insures the doors always coming up in place. The same arrangement of pipe is used for the centre connection of the brake rod, which admits of the brakes being applied to all eight wheels by a staff at either end of the car.

Train Accidents in December.

COLLISIONS.

REAR.

2d, on New York, Lake Erie & Western, at West Junction, N. J., a New York, Ontario & Western freight train ran into the rear of an Erie freight, wrecking an engine, caboose and 10 cars.

4th, on New York & New England, near Terryville, Conn., freight train broke in two and the rear section ran into the forward one, piling 12 cars up in a bad wreck.

5th, on St. Louis, Alton & Terre Haute, at Coultersville, Ill., freight train ran into a preceding freight, doing considerable damage. Three trainmen injured.

8th, on Pennsylvania, near Hickory Grove, Pa., freight

train broke in two on a curve and the forward portion of the train, in returning for the detached cars, collided with them. Ten cars badly damaged.

9th, on Cleveland, Columbus, Cincinnati & Indianapolis, near Evendale, O., freight train broke in two and the rear portion ran into the forward one, doing some damage.

10th, 5 a. m., on Boston & Albany, at Asbland, Mass., a freight train which had been detained by breaking in two was about to start on its way when it was run into by a following freight, wrecking 8 loaded cars and injuring the engineer. The track was blocked for 12 hours. The flagman of the foremost train had been picked up by the following train several miles back. The morning was very foggy.

10th, on Huntingdon & Broad Top, at Coalmont, Pa., the passenger car of a mixed train standing at the station was run into by a freight train approaching from the rear. The car stood on a grade and a passenger, seeing the impending collision, let off the brake and got the car in motion before the engine struck it; but six passengers were seriously injured.

10th, on New York, Lake Erie & Western, near Carbon-
dale, Pa., a freight train stalled on a grade was run into by
a following freight.

A third train immediately ran into the second; two engines, two cabooses, and a number of cars were wrecked, and two trainmen injured.

10th, on Northern Pacific, at Puyallup, Wash. Ter., passenger train standing at the station, having been there according to reports only about 3 minutes, was run into by a freight train, telescoping the rear sleeper and wrecking the engine and several freight cars. Engineer and 1 passenger killed and 2 passengers injured. The runner did not know the road, and there was a dense fog.

12th, on New York Central & Hudson River, at Bronxville, N. Y., a passenger train ran into some freight cars which a high wind had blown out of a siding so as to obstruct the main track. Engine derailed and, together with several box cars, damaged.

18th, 3 a. m., on Philadelphia & Reading, at West Milton, Pa., freight train ran into rear of another freight, wrecking an engine and 16 cars. Engineer killed. The coroner's jury found that the engineer of the second train was negligent by reason of want of sleep.

14th, on Pittsburgh & Western, near Akron, O., freight train ran into the rear of a passenger train which had stopped to pick up a man who had been run over and killed. Engine disabled and a sleeping car and 2 coaches wrecked. All the passengers had escaped from the cars before the collision.

14th, on Boston & Maine, near Belchertown, Mass., an empty engine ran into the rear of a freight train, wrecking the engine and caboose and overturning several cars. Three trainmen injured.

15th, on New York & New England, at Bristol, Conn., freight train ran into the rear of a passenger train switching on the main track, damaging the engine and rear coach.

16th, on New York, Lake Erie & Western, near Belvidere, N. Y., freight train broke in two, and the rear portion ran into the forward one, wrecking 3 cars.

19th, on New York Central & Hudson River, near Cox-sackie, N. Y., a freight train which had stopped to cool a hot box was run into by a following freight, damaging engine, caboose and several cars. The wreck caught fire, and several cars were consumed.

20th, on Atchison, Topeka & Santa Fe, near Wichita, Kan., passenger train ran into the caboose of a freight going on to siding, doing considerable damage. Engineer killed, 1 passenger seriously injured.

21st, on New York, Lake Erie & Western, at Corning, N. Y., freight train ran into the rear of a standing freight, disabling the engine and demolishing the caboose.

34th, on Louisville & Nashville, at Bardstown Junction, Ky., express train ran into the rear of a preceding local passenger train standing at the station, which is on a sharp curve. Two passengers killed, 11 injured. The local train had fallen back upon the time of the express, but had no flag out. An operator was discharged for not holding the express at the preceding station.

25th, on Missouri Pacific, near Butler, Mo., 4 cars broke loose from a freight train, and ran back down grade into the head of another freight. Engine and several cars badly wrecked, and about a dozen cars derailed. A boy stealing a ride in a coal car was badly hurt.

27th, on New London Northern, near New London, Ct., freight train broke in two, and the rear section was run into by a following freight. Engine and 7 cars wrecked.

27th, on Pine Creek Railroad, near Level Corners, Pa., a freight train ran into the rear of a Beech Creek passenger train, which had been stopped by a preceding freight train, but had not sent a flag far enough back; engine and rear passenger car damaged. The force of the collision shoved the

passenger locomotive into the caboose of the forward freight train, damaging both. The passenger car caught fire from the stove, but it was soon put out. Two trainmen injured.

30th, on Louisville & Nashville, near Deatsville, Ala., passenger train collided with a car loaded with lumber, which had run down grade from a siding on to the main track. The locomotive was wrecked. The fireman was struck by a piece of timber and killed and the engineer slightly injured.

31st, on Allegheny Valley road, at East Brady, Pa., an extra freight train ran into the rear of a freight standing in the yard, piling up the engine and 6 cars in a bad wreck, which caught fire and was partially consumed.

RUTTING.

3d, on Central of New Jersey, near Solomon's Gap, Pa., butting collision between two freight trains, due to a mistake in orders, making a very bad wreck. Three trainmen killed and 3 injured.

4th, on Northern Pacific, near Cocolalla, Idaho, butting collision between a freight and a construction train, demolishing both locomotives and several cars. One trainman killed, 2 fatally injured.

5th, on Lake Shore & Michigan Southern, near Youngstown, O., butting collision between a mixed train and a

down, 6, butting collision between a mixed train and a freight, wrecking both engines and 10 cars. Two trainmen killed, 2 injured. The freight should not have left Youngstown until the arrival of the mixed train, but just as the latter was due another train came in ahead of it, and the engineer of the freight started out, assuming that it was the regular train which had arrived.

5th, on Norfolk & Western, near Mill Creek Junction, Va., butting collision between a freight and an officers' train. It is said the latter was running on the time of the freight without proper authority.

5th, on Burlington & Missouri River, in Hastings, Neb.,
butting collision between a freight train and a yard engine,
disabling both machines. Fireman fatally hurt.

7th, on Philadelphia & Reading, at Rattling Run, Pa.,
butting collision between a passenger and a freight train,
disabling both locomotives. Several passengers slightly
hurt.

7th, on Pittsburgh, Fort Wayne & Chicago, in Chicago, Ill., butting collision between a north-bound freight train

drawn by three locomotives and a yard engine. All the engines were badly damaged.

8th, on Philadelphia & Reading, near Mt. Carmel, Pa., butting collision between two freight trains, wrecking both engines and a dozen box cars.

9th, on New York Central & Hudson River, near Palmyra, N. Y., butting collision between two freight trains, wrecking both engines and derailling a portion of each train.

10th, on Illinois Central, at Manteno, Ill., a butting collision between two freight trains piled up both engines and 12 cars in a bad wreck. Brakeman killed.

10th, on Denver & Rio Grande, near Littleton, Col., a Chicago, Rock Island & Pacific passenger train ran over a misplaced switch and into the head of a Denver & Rio Grande freight train, wrecking both engines, a baggage and several freight cars. Engineer and fireman of the Rock Island train severely injured, several passengers thrown out of their seats and bruised. The freight had just backed on to the side track, and a brakeman neglected to reset the switch.

10th, at Brookline, Ill., a Lake Shore & Michigan Southern freight train was turned by a misplaced switch on to the line of the New York, Chicago & St. Louis and collided with a switch engine bound in the opposite direction. Both engines and several cars wrecked. One trainman injured by jumping.

10th, on New York Central & Hudson River, at Fairfield, N. Y., butting collision between two freight trains, demolishing both engines and wrecking several cars. A dense fog prevailed at the time. One trainman injured.

11th, on St. Louis, Iron Mountain & Southern, near Little Rock, Ark., butting collision between a freight train and a locomotive out on a trial trip. Both engines and several cars badly damaged.

13th, on Chicago, Milwaukee & St. Paul, near Reed's Landing, Minn., butting collision between a passenger train and a freight. Both engines were derailed and thrown down an embankment; 8 loaded freight cars wrecked and several passenger cars derailed. One trainman killed and 4 injured. The collision was due to the freight crew forgetting a recent change of schedule.

14th, near Gifford, Ia., butting collision on a bridge between Chicago & Northwestern and Central Iowa freight trains, on the line of the former, demolishing both locomotives and knocking down a span of the bridge. Six trainmen injured, one of them fatally.

15th, on Lehigh Valley, near East Mauch Chunk, Pa., butting collision between a passenger train and a switching engine; both locomotives and several coaches damaged.

17th, on Central Pacific, at Stockton, Cal., a northbound passenger train standing at the station was run into by a southbound passenger train, the speed of which, owing to the creak in the air pipe having been tampered with while leaving the preceding station, could not be controlled. Both engines and an express car wrecked. Two trainmen injured by jumping.

17th, on Concord road, at Garvin's Falls, N. H., butting collision between two switching engines in a dense fog, demolishing both engines. One trainman killed and two seriously injured.

17th, on New York, Chicago & St. Louis, near Fort Wayne, Ind., butting collision between two freight trains, wrecking both locomotives and 13 cars.

19th, on Minneapolis & St. Louis, in Minneapolis, Minn., butting collision between two passenger trains, disabling both engines. One trainman killed and 2 injured.

19th, on New York, Lake Erie & Western, at Waverly, N. Y., butting collision between two freight trains.

22d, on Pennsylvania, near Allenwood, Pa., butting collision between two freight trains, demolishing both engines.

22d, butting collision between East Tennessee, Virginia & Georgia and Georgia Pacific passenger trains, on the joint track near Austell, Ga., demolishing both locomotives. Three trainmen injured.

24th, on Chicago, Rock Island & Pacific, near Goodland, Kan., butting collision between two passenger trains.

25th, on Philadelphia & Reading, at Conshohocken, Pa., butting collision between a passenger train and a freight, injuring a trainman.

25th, night, butting collision between Denver & Rio Grande and Chicago, Rock Island & Pacific freight trains, near Colorado Springs, Col., wrecking both engines.

28th, on Chicago, Rock Island & Pacific, near Tip Top, Col., a butting collision between two freight trains piled up both engines and several cars in a bad wreck. Two trainmen killed, 2 injured.

29th, on Brunswick & Western, near Gray's Mill, Ga., butting collision between two freight trains, wrecking both engines and several cars and killing 10 mules. One of the trains disobeyed orders.

29th, on Pittsburgh, Cincinnati & St. Louis, at Burgettstown, Pa., butting collision between an empty switching passenger train and a freight, wrecking both engines and 3 freight cars. Fireman slightly hurt.

30th, on Cincinnati, Indianapolis, St. Louis & Chicago, near Lawrenceburg, Ind., butting collision between two freight trains, due to a misplaced switch, disabling both locomotives.

31st, on St. Louis, Iron Mountain & Southern, near Bushburg, Mo., butting collision between two freight trains piled up both engines and a portion of each train in a very bad wreck. One trainman killed.

CROSSING AND MISCELLANEOUS.

8th, on Denver & Rio Grande, at San Carlos, Col., a freight train entering a side track for the purpose of meeting another freight stopped before it had pulled into the turnout far enough to clear the main track. The train coming from the opposite direction was not slackened sufficiently, and ran into the caboose. The rear brakeman of the foremost train, knowing that his train had not cleared the main track, had not set up the switch, and 2 engines and 5 cars of the other train were derailed and ditched.

10th, on New York, New Haven & Hartford, at Fairfield Quarry, Conn., a west-bound freight train ran into a ballast train crossing the main track, damaging an engine and 8 cars. The ballast train had no flag out.

16th, at the crossing in North Penn Junction, Pa., a Pennsylvania fast express train dashed into a Philadelphia & Reading freight train, disabling an engine and demolishing several freight cars. One trainman hurt.

17th, on Delaware & Hudson Canal Co.'s road, at Waterford Junction, N. Y., passenger train moving at considerable speed ran into the engine of a slowly moving freight train at a grade crossing. Both engines, baggage car and 2 freight cars wrecked, and express messenger badly injured. There was a dense fog at the time.

20th, on Baltimore & Ohio, at Brown's Siding, Pa., freight train ran into the side of a freight moving on to a side track, piling up an engine and 20 cars in a bad wreck.

23d, on Baltimore & Ohio, at Brown's Siding, Pa., a heavy freight train approaching the station was not controlled and dashed into the side of a freight train moving into a turnout, making a bad wreck.

23d, on New York, Lake Erie & Western, at Port Jervis, N. Y., passenger train ran into the side of a freight train

moving on to a siding, doing considerable damage. Fireman killed and engineer badly scalded.

DERAILMENTS.

DEFECTS OF ROAD.

13th, on California Southern, near Encinitas, Cal., passenger train thrown from the track by the spreading of the rails, all the cars except the rear sleeper going off an embankment. Express messenger seriously injured.

14th, on Florida Railway & Navigation Co.'s road, near Tallahassee, Fla., fruit train derailed by a defective switch and badly wrecked. Two trainmen killed and one badly injured.

18th, on New York Central & Hudson River, in Rochester, N. Y., empty engine derailed and damaged by a broken frog.

18th, on Cincinnati, Jackson & Mackinaw, near Augusta, Mich., a freight train broke through a trestle crossing the Michigan Central tracks. The caboose and 14 cars were piled up in a bad wreck, which caught fire and, together with the trestle, was partially consumed. Two trainmen injured.

18th, on New York & New England, near Club House, Conn., 3 cars of a freight train thrown from the track by the spreading of the rails.

20th, on Chesapeake & Ohio, at Glade, W. Va., several cars of a freight train derailed at a frog as the train was pulling out of a side track.

21st, on Arizona & Southeastern, near Bisbee, Ariz., construction train derailed by a defective switch. Two cars went over an embankment, killing one and injuring two laborers.

23d, on Western & Atlantic, at McIvor's Station, Ga., passenger train thrown from the track by the spreading of the rails, wrecking the engine and 3 cars. One trainman killed, one trainman and several passengers injured. The coach was overturned and caught fire from the stove, but the flames were quickly extinguished.

25th, on St. Louis, Arkansas & Texas, near Ft. Worth, Tex., passenger train broke through a bridge, wrecking several cars. Two trainmen and three passengers injured.

25th, on Colorado Midland, near Lime Creek, Col., freight train was derailed and badly wrecked at a point where a new switch was being put in. Two trainmen killed.

27th, on Boston & Albany, at Springfield, Mass., a car in a freight train was derailed at a facing-point switch.

27th, on Montana Central, near Helena, Mont., passenger train derailed by the breaking of a switch-rod, the engine and one car being overturned. Fireman killed and a passenger badly burnt by an overturned stove.

27th, on Missouri Pacific, near Little Rock, Ark., tender of engine of freight train derailed at a switch. The engine and several cars were badly damaged, the former being overturned in the ditch. Two trainmen injured.

31st, on Chicago, Milwaukee & St. Paul, at East Tama, Ia., passenger train thrown from the track by a broken rail, killing the engineer and fireman.

DEFECTS OF EQUIPMENT.

3d, on Baltimore & Ohio, near Hogsett, Pa., freight train derailed and wrecked by the breaking of an axle.

6th, on New York & New England, at Springfield, Mass., 2 cars of a freight train derailed by a broken brake-beam.

6th, on Burlington & Missouri River, at Haxton, Col., several cars of a freight train derailed by the dropping of a brake beam and wrecked. A brakeman was fatally injured.

8th, on St. Johnsbury & Lake Champlain, near St. Johnsbury, Vt., a wheel under a car in a freight train broke and 10 cars were thrown over an embankment and completely wrecked.

9th, on Chesapeake & Ohio, near Dunlap, Va., 5 cars of a freight train derailed by a broken wheel. Road blocked for 7 hours.

10th, on Pennsylvania, at Kinkora, N. J., five cars of a freight train were derailed by the breaking of a wheel. A station platform was demolished.

11th, on Delaware & Hudson Canal Co.'s road, near Archibald, Pa., mail car of a passenger train derailed by a broken wheel and damaged.

11th, night, on Chesapeake & Ohio, near Covington, Va., freight train derailed by a broken wheel.

23d, night, on New York Central & Hudson River, at Churchville, N. Y., passenger train running at high speed derailed and ditched, some of the cars being badly damaged. Two passengers killed and 13 injured. It is supposed that the accident was caused by the breaking of the flange of one of the locomotive driving wheels.

28th, on East Tennessee, Virginia & Georgia, near Burnsville, Ala., passenger train derailed by a broken axle, and 2 coaches partially overturned. Several passengers injured.

NEGLIGENCE IN OPERATING.

7th, on St. Joseph & Grand Island, near Carleton, Neb., freight train derailed by a misplaced switch.

8th, on Denver & Rio Grande, near Bessemer, Col., freight train drawn by two engines derailed by a misplaced switch. The hindmost engine was overturned in the ditch and 5 coal cars wrecked.

10th, on New York, New Haven & Hartford, at the crossing of the New York & New England in Hartford, Conn., passenger train thrown from the track by the derailling switch, the runner failing to notice that the signal was against him.

13th, on Chicago, Kansas & Nebraska, in North Topeka, Kan., passenger train ran over a misplaced switch and into the rear of a freight train standing on a side track, doing some damage.

19th, on Missouri Pacific, near Lone Tree, Mo., engine and several cars of a freight train derailed by a misplaced switch.

22d, on New York, Lake Erie & Western, in Binghamton, N. Y., freight train ran over a misplaced switch and into the side of another freight. Engine and 15 cars wrecked.

23d, on Oregon Railway & Navigation Co.'s road, near Alto, Wash. Terr., freight train descending a grade became unmanageable and the tender and 10 cars were derailed, and went over an embankment. One trainman killed and another injured.

24th, on Denver & Rio Grande, at Framington, Utah, engine and baggage car of passenger train derailed by a misplaced switch and upset. Engineer and fireman seriously injured.

25th, on Colorado Midland, near Leadville, Col., a freight train descending a heavy grade became uncontrollable, and was derailed, and hurled against the side of the mountain at a point where the speed was too high for the curve, making a complete wreck. Three trainmen killed.

28th, on Texas & Pacific, near New Orleans, La., engine of passenger train derailed by a misplaced switch and wrecked, killing the engineer.

UNFORESEEN OBSTRUCTIONS.

3d, on St. Louis, Iron Mountain & Southern, near Wynne, Ark., passenger train ran over a horse; engine and baggage car derailed and thrown over an embankment. Two trainmen injured.

5th, on Cincinnati, Hamilton & Dayton, at Cumminsville, O., forward truck of engine of passenger train derailed at a crossing by a loose plank which had presumably been shoved against or upon the rail by a passing wagon.

10th, on Atchison, Topeka & Santa Fe, near Oak Valley, Kan., passenger train ran over a cow and was derailed and partially wrecked. Engineer hurt.

13th, on Louisville & Nashville, near Fountain Head, Tenn., passenger train ran over a cow derailling the engine and a box car. Engineer and fireman injured.

17th, on Southern Pacific, near Fremont, Cal., engine of freight train derailed and damaged by telegraph poles, which had been maliciously placed across the track.

17th, on New York & New England, near East Thompson, Conn., an east-bound express train moving slowly was derailed at a washout.

18th, on St. Louis & San Francisco, at Lyman, Mo., empty engine derailed at a switch, the bolts of which had been removed by some miscreant. The engine ran over the sleepers some distance and was badly damaged. The fireman sustained a broken ankle, but succeeded in making his way back a good distance to flag a following passenger train, whose destruction had evidently been the object of the persons who broke the switch.

18th, on Western & Atlantic, near Allatoona, Ga., freight train ran over a cow and was derailed and wrecked, injuring 1 trainman fatally and 2 slightly.

19th, on Carolina Central, near Lilesville, N. C., locomotive of a passenger train derailed and ditched by a large rock which had rolled down upon the line. Engineer hurt.

21st, on New York, Lake Erie & Western, at Corning, N. Y., 6 loaded cars of a west-bound freight were thrown from the track and badly damaged by the caboose of an east-bound freight being wrecked in a rear collision and thrown over against them.

UNEXPLAINED.

1st, on New York & New England, near Bristol, Conn., freight train derailed and a number of cars wrecked.

1st, on Texas Trunk, near Kemp, Tex., engine derailed and ditched.

5th, on Cincinnati Southern, near Cincinnati, O., 4 cars of a freight train derailed and tipped off a trestle.

5th, on Pennsylvania, in Pittsburgh, Pa., 3 cars of a freight train derailed.

6th, on Kansas City, Fort Scott & Memphis, near Mansfield, Mo., freight train derailed and 9 cars wrecked.

8th, on Atlantic & Pacific, near Crookton, Ariz., passenger train derailed, and the engine and a portion of the train thrown into a deep gorge, making a complete wreck. Four trainmen and a number of passengers injured.

8th, on New York Central & Hudson River, near Scarsdale, N. Y., two cars of construction train derailed.

10th, on Missouri Pacific, near Cypress, Kan., a car of a passenger train derailed.

15th, on Vicksburg & Meridian, near Newman's, Miss., 5 freight cars of a mixed train derailed and wrecked.

15th, on New York & New England, near East Hartford, Conn., switching engine with 10 persons on board was derailed. One of the men was caught between the engine and tender and killed, and several others injured.

15th, on Cleveland, Lorain & Wheeling, near Wheeling, W. Va., engine of a passenger train derailed on a 30 ft. trestle; it fell through and was badly wrecked. Engineer killed.

18th, on Savannah, Florida & Western, near Gainesville, Fla., freight train derailed and 7 cars ditched.

19th, on San Antonio & Aransas Pass, near Houston, Tex., construction train derailed. Two trainmen and a laborer killed and 2 laborers injured.

21st, on St. Louis, Alton & Terre Haute, near Belleville, Ill., freight train derailed and wrecked. One trainman killed and 2 injured.

24th, on California Central, near Inglewood, Cal., 3 box cars in a mixed train derailed and thrown down an embankment.

26th, on Old Colony, near Howlands, Mass., 18 coal cars in a freight train derailed and wrecked.

27th, on Cincinnati, Selma & Mobile, near Selma, Ala., passenger train derailed and several cars damaged.

OTHER ACCIDENTS.

2d, on Philadelphia & Reading, near Atlantic City, N. J., engine of passenger train broke both parallel-roads, the loose ends of which completely demolished the cab.

2d, on Philadelphia & Reading, at Reading, Pa., air reservoir of locomotive standing in the yard exploded. Two boys standing near by were thrown against a freight car by the force of the explosion and injured.

5th, on Missouri Pacific, near Holland, Tex., truck under tender of engine of passenger train broke.

15th, on Manhattan Elevated, near Third Avenue and Twenty-third street, New York City, engine of passenger train broke a connecting-rod, causing considerable delay.

17th, about 5 a. m., on Illinois Central, near Kankakee, Ill., rear sleeper of passenger train was found to be on fire, but the flames were soon extinguished.

18th, on Lehigh Valley road, near Mauch Chunk, Pa., as a freight train was crossing the bridge over the Lehigh River, the roof of a freight car was blown off by a sudden gale and carried into the stream. A brakeman went down with it, but escaped uninjured.

18th, on New York, Susquehanna & Western, near Newfoundland, N. J., a large tree was uprooted by a tornado and thrown on top of a passing milk train, knocking in the roofs of two cars.

21st, on Pittsburgh, Cincinnati & St. Louis, at Idlewood, Pa., the cab of the engine of a fast passenger train was knocked off by striking a derailed car of a standing freight, which had been thrown over so as to foul the passenger's track. The fireman was killed.

22d, on Manhattan Elevated, near Ninth Avenue and 104th street, New York City, engine of a passenger train disabled by a broken piston rod.

22d, on Illinois Central, near Tuscola, Ill., a hot water pipe in a car of a passenger train exploded, immediately filling the car with steam. All of the passengers tried to get out of the car at once, and several of them were injured in the attempt.

24th, on Cincinnati, Washington & Baltimore, near Blanchester, O., engine of passenger train exploded its boiler while moving at good speed. Though the whole top of the boiler was torn off, the engineer and fireman escaped uninjured, the force of the explosion being forward and upward.

24th, on Union Elevated, in Brooklyn, N. Y., engine of passenger train blew out a cylinder-head.

A summary will be found in another column.

Plate Planing Machine.

The accompanying cut shows a machine designed to plane two edges of a plate up to 30 ft. in length, by 10 ft. in width, at one setting, or any length by shifting. This arrangement admits of finishing the entire plate at two settings, and it saves room, for with the usual type of machine, which cuts but one edge at a time, the plate has to be set transversely as well as parallel to the bed, requiring a space in both directions equal to its greatest length. The planer has sufficient power to work 1 in. steel plates with ease, and is

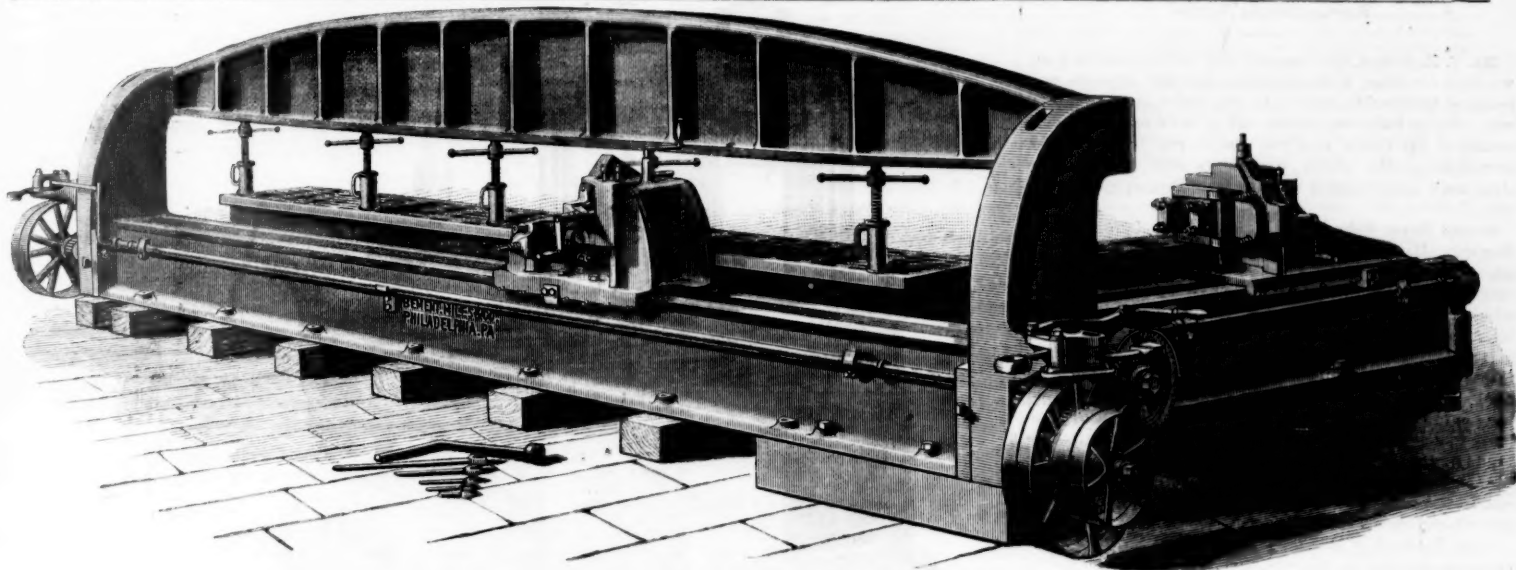


PLATE PLANING MACHINE.

Made by BEMENT, MILES & CO., Philadelphia, Pa.

therefore serviceable for heavy marine boilers and ship-plating. The carriage on the longer bed has two tool slides facing each other and cutting in reverse directions, one of them having a vertical slide with a swivel for cutting a strip off the edge of a sheet, and for planing internal angles. The transverse bed is arranged to swivel on a base-plate by means of a pinion and circular rack, giving a variation of 10 deg. in either direction from a right angle. As its carriage has much less to do than the other, it has but one tool slide, cutting in one direction, with a quick return action. The clamping bar is bolted to the up-rights, and the plates are held in position by hand screw-jacks, which can be quickly placed and removed. Owing to the space between the clamping-bar and the table, the machine can be used for planing beams, keels and a variety of other work. Each carriage has an independent driving gear, operated by two belts for the forward and backward movements, separately shifted. The builders are Bement, Miles & Co., Philadelphia, Pa.

Fast Feed Flooring Machine.

The cut herewith represents a new improved fast-feed flooring machine, which has been designed especially for fast work and quick adjustments. The frame is curved and heavily ribbed on the inside, all parts planed, and is a strong and well-braced frame.

The cutting cylinders are slotted on all four sides, each side having a knife. The journals are long, of large diameter and revolve in self-oiling boxes.

The feed consists of six 7-in. feed rolls, all heavily geared. The system of gearing on this machine is entirely new, and consists of all the rolls being driven by internal and external gearing, without expansion links; each upper feed roll is made to lift parallel, thus giving a full and even pressure across the surface of the board. This is effected by a new and ingenious device for raising and lowering the upper rolls, which can be done instantly to accommodate the thickness of stock. Each roll is furnished with an improved scraper, to keep it free from gum. The two upper front feed rolls are held down by a weighted equalizing bar, allowing ample lifting range to suit unequal stock.

The pressure bars are made to adjust in and out on each side of the cutting cylinder, giving the machine all the advantages of an inside molder and enabling the operator to do smooth work.

The matcher spindles run in long connected bearings, and the matcher hangers have separate adjusting screw and locking device, to allow for width of stock to be cut and to insure equal wear on the bed. Adjustable hold-down brackets are provided to hold the stock firmly while matching is being done. The bed plate is made to take out, for the purpose of truing up when necessary.

The independent beader and pressure bar for the lower cylinder can be swung out of the way by simply taking out one pin.

The builders especially recommend this machine to all car shops, contractors, car-builders and planing mills for general work, on account of its quick adjustment and its simplicity of construction.

Two sizes of this machine are made to work 9 in. wide and 14 in. wide respectively, and to work either three or four sides.

For further information address the builders, the Egan Co., Cincinnati, O., U. S. A.

Trials of the Boyden Brake.

We give below a table of trials of the Boyden brake, made Dec. 17, 18 and 19, 1888, on the Baltimore & Ohio.

The Boyden brake comprises an air-pump, an air-reservoir on the locomotive, a valve to be worked by the engineer in his cab, a brake for the locomotive, a train-pipe, a pressure regulator to control the compressed air which enters the train-pipe, hose couplings between the cars, and the automatic spring brake device and valve on each car.

The equipment was applied to the first new locomotive No. 830,

weighing with the tender 164,000 pounds, built at Mt. Clare, after designs by Mr. A. J. Cromwell, Superintendent of Motive Power, and to twenty-five new refrigerator cars, each weighing over 36,000 pounds empty. Attached to the train was Manager Clement's private car, and the Resident Engineer's test car, equipped with instruments for showing the speed of the train, brake pressure, etc. These two cars had the Westinghouse automatic brake.

The test train left Mt. Clare, Baltimore, Monday morning,

—no variation being noticed in a speed of about 30 miles per hour. At Martinsburg, on the return trip, the train, then consisting of locomotive, nine refrigerator cars and the two coaches, was put on fast express train time to Baltimore. The run from Washington to Relay, 31 miles, was made in 38 minutes. The run included all that part of the road which embraces the steepest grades.

The table below gives the official record of the tests which

BRAKE TESTS MADE ON THE BALTIMORE & OHIO RAILROAD OF THE BOYDEN POWER BRAKE.
Dec. 17, 18 and 19, 1888.

Date.	No.	Length of train, Feet.	Weight of train, Pounds.	Grade, Feet per mile.	Speed, Miles per hour.	Time of stop, Seconds.	Distance, Feet.	REMARKS.
Dec. 17...	1	1,100	1,179,000	Des. 80	30	24	920	Brakes applied. Heavy rain.
" 17...	2	1,045	1,015,000	" 80	35	21 1/2	920	Engine cut loose.
" 17...	3	1,100	1,179,000	Asc. 23	24	13 1/2	250	Brakes applied.
" 18...	4	1,063	1,142,600	" 10	31	13	300	" " " " " " " "
" 18...	5	1,063	1,142,600	Des. 53	33	14	590	" " " " " " " "
" 18...	6	1,063	1,142,600	" 15	37	15	588	" " " " " " " "
" 18...	7	1,063	1,142,600	Level.	42	16	615	" " " " " " " "
" 18...	8	1,063	1,142,600	Des. 116	32	17	620	" " " " " " " "
" 18...	9	1,063	1,142,600	" 116	47	20	965	" " " " " " " "
" 18...	10	1,008	978,600	" 116	28	14	500	Engine cut loose.
" 18...	11	943	1,037,600	" 106	45	"	963	Brakes applied.
" 19...	12	508	506,000	" 92	32	15	468	" " " " " " " "
" 19...	13	508	506,000	" 116	34	25	883	" " " " " " " "
" 19...	14	508	506,000	" 116	36	24	821	" " " " " " " "
" 19...	15	508	506,000	" 26	50	22	1,023	" " " " " " " " Clear.

Dec. 17, 1888, at 9 o'clock. Accompanying the train on the part of the railroad company were: Manager W. M. Clements, and his private secretary; P. H. Irwin, Resident Engineer; Andrew Onderdonk, Assistant Engineer; A. J. Cromwell, Superintendent of Motive Power, and his secretary; Thomas Fitzgerald, Superintendent Eastern Division; and Trainmaster McGuire. The brake company was represented by Mr. George A. Boyden and his assistants.

An accurate record was kept of each stop by Mr. Irwin and Mr. Onderdonk, who had charge of the speed indicator.

After passing Martinsburg, a coupling pulled out while running at high speed, and the train parted into two sections; the brake immediately applied by its automatic action, and both sections came to a stop without injury.

At a point west of Terra Alta, on the steepest grade of the road (116 ft.) the engineer was running the train faster than he should have done—persons in the coaches estimated the speed at 60 miles—whereupon Mr. Clements pulled the valve in his car at the rear, thereby causing all the brakes throughout the train to apply, and bringing the whole train to an easy stop.

On the eastward run (Dec. 19), on grades near Chent River, for a distance of some ten miles, special regard was had to the performance of the brake in controlling the train

is sent out over the signature of Mr. P. H. Irwin, resident engineer.

The engine was completely equipped with the Boyden driver-brake, air pump, pressure regulating valve and engineer's valve. In stop No. 11, the two coaches fitted with the Westinghouse brake were detached, and the entire train then consisted of the engine and twenty-four refrigerator cars, all of which were equipped with the Boyden brake.

Nos. 1 and 3 train consisted of engine, 25 refrigerator cars and 2 private coaches.

No. 2 train consisted of 25 refrigerator cars and 2 private coaches.

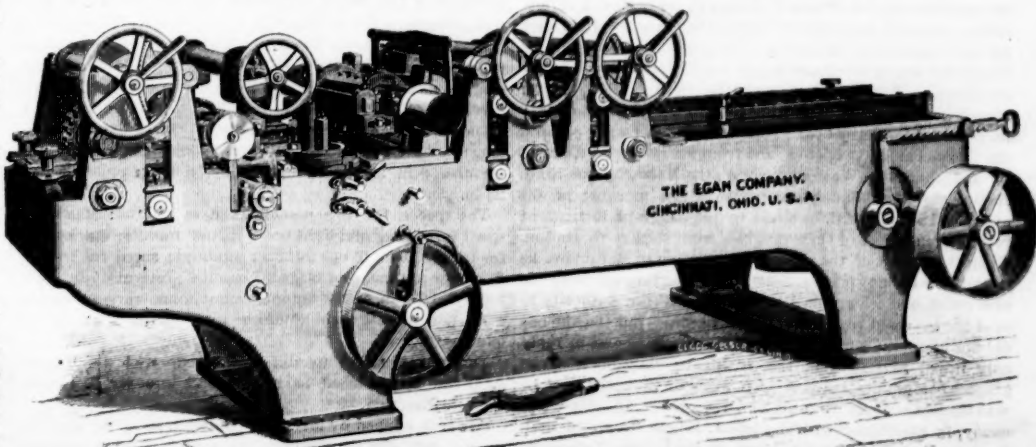
Nos. 4 to 9 inc. train consisted of engine, 24 refrigerator cars and 2 private coaches.

No. 10 train consisted of 24 refrigerator cars and 2 private coaches.

No. 11 train consisted of engine, 24 refrigerator cars.

Nos. 12 to 15 inc. train consisted of engine, 9 refrigerator cars and 2 private coaches.

Tests Nos. 1 to 11 inclusive were made running west. Tests Nos. 11 to 15 inclusive were made running east. The cars were all coupled with the Janney coupler except between the two coaches, which was a link and pin coupling. The two coaches were on the rear end of the train, and fitted with the Westinghouse automatic air brakes. After these tests were made, a careful examination showed that none of the car wheels were flattened. The braking power applied was fifty per cent. of the total weight of the car.



FAST FEED FLOORING MACHINE.

Samuel Morse Felton.

Mr. S. M. Felton, who recently died in his eightieth year, was long identified with important railroad interests, and rendered inestimable services to the nation during the civil war. In the following sketch but a brief and inadequate outline of his career is given, but it sets forth the most prominent events. Fuller particulars may be found in Appleton's Encyclopedia of American Biography, last edition.

Samuel Morse Felton was born July 17, 1809, at West Newbury, Mass. His early opportunities were of the slightest, and at the age of fourteen he was obliged to enter a grocery store in Boston as clerk. While here he devoted his leisure to study with the intention of fitting himself for college. In 1827 he was enabled to complete his preparations at the Livingston County high school at Geneseo, N. Y., of which his brother, C. C. Felton, afterward President of Harvard University, had in that year become principal. From here he went to Harvard, where he graduated in 1834, supporting himself during his course by teaching. After his graduation he began the study of the law, but, finding the confinement too much for his health, his strong taste for mathematics led him to become assistant in the office of the famous engineer, Loammi Baldwin.

Upon the death of Mr. Baldwin in 1838, Mr. Felton became his successor in business, and was much employed as an engineer in and about Boston. His first railroad work was the construction, in 1841, of the Fresh Pond Railroad, designed to carry ice for export into Boston. In 1843, he began the construction of the Fitchburg Railroad, and was for several years employed as Chief Engineer upon this and the Central Vermont and other connecting roads in the northern part of New England. In 1845, he became Superintendent of the Fitchburg road, and from this time till his death was connected with railroad management.

In 1851, Mr. Felton was chosen President of the Philadelphia, Wilmington & Baltimore Railroad, and removed to Philadelphia. He found this road demoralized and unprofitable, but in a few years made it, what it has since remained, one of the best equipped and most profitable in the country. While president of this railroad, in 1852, he interrupted a scheme which certain inexperienced persons were pushing through, of building from New York across lower New Jersey to the Delaware, thence across the state of Delaware to the Susquehanna, and so by what they called an air line to Washington. From this unpromising scheme Mr. Felton developed the Delaware Railroad, traversing the length of the peninsula to Wilmington and there connecting with the Philadelphia, Wilmington & Baltimore. To this event may be traced the fruit business of the peninsula, which has attained such great proportions. The town of Felton, very appropriately named in recognition of his services by the Delaware Legislature, is now one of the chief fruit-shipping points in the state.

During his connection with the Philadelphia, Wilmington & Baltimore he was offered the presidency of other and more extensive roads, among them the Baltimore & Ohio and the Reading, the latter at a salary larger than any then given to any railroad officer in the country. But feeling under obligations to the principal stockholders of the Philadelphia, Wilmington & Baltimore, at their desire he declined these offers.

The outbreak of the war made the line of railroad managed by Mr. Felton of great strategic importance, and brought to him opportunities of public usefulness which he improved to the utmost. During the winter of 1860-61, he had detectives constantly at work in Baltimore and elsewhere among the disaffected. The information thus acquired led him to believe that Mr. Lincoln's life would be endangered if he traveled by the advertised route to Washington for his inauguration. The change in Mr. Lincoln's plans and his secret journey to Washington were managed by Mr. Felton with so much skill that no news of the matter reached the public until the president-elect had been for many hours at the capital. This precaution was amply justified by the attack made by the Baltimore mob at the Northern Central station upon the train supposed to carry Mr. Lincoln, an account of which may be found in the Baltimore Sun of Feb. 23, 1861. A full account of the entire episode may be found in the Life of Lincoln, by Nicolay and Hay, now being published in the Century.

Though Mr. Felton was well aware of the danger that menaced the Philadelphia, Wilmington & Baltimore when it became necessary to transport troops at the outbreak of hostilities, he never hesitated to forward the cause of the Union by every means in his power. He was informed that the transportation of Northern troops would be followed by the destruction of the bridges over the Bush and Gunpowder rivers, in the vicinity of Baltimore. To meet this emergency he prepared the ferry-boat "Maryland," then employed upon the Susquehanna, to open a line from Perryville to Annapolis and thence to Washington. As the Massachusetts Sixth Regiment left Philadelphia, early in the morning of the eventful 19th of April, he stood by the telegraph instrument receiving messages of their progress from station to station. Upon the receipt of the news of the rioting in Baltimore, he instantly set about preparations for forwarding troops by his new route, and telegraphed to Washington for authority to send the expected regiments to Annapolis. But the officials did not know the whole gravity of the situation and in reply only urged him to send the troops to Baltimore. Telegraphic communication was soon after interrupted and he was thrown entirely upon his own resources. In this emergency, in association with the late J. Edgar Thomson and the late E. S. Sanford, President of the Morse Telegraph Co., he labored with untiring zeal and energy to perfect

the new line. Not only did he send the troops under Gen. Butler to Annapolis, but he prepared plans for the co-operation of all the railroads centering in Philadelphia, the telegraph lines and the Adams Express Company and their employment in the service of the government. He hurried steamboats, chartered on his own responsibility, through the Delaware & Chesapeake Canal to Perryville; he purchased provisions and interviewed state and city authorities and commanders of regiments, and all this, while attending personally to every detail of ordinary railroad management. These efforts were crowned with success. The troops under Gen. Butler opened and held the line from Annapolis to Washington, and saved the Capitol from the enemies who beset it upon every side. For this service, assuredly not the least of the many rendered by railroad men to the cause of the Union, Mr. Felton received the thanks of the War Department.

Though the most memorable, this was not the last of Mr. Felton's labors in behalf of the Government. The strain of anxiety and responsibility endured by him throughout the war at length brought on an attack of paralysis which compelled his retirement for a time from active life.

After some months of rest Mr. Felton was sufficiently recovered to assume the Presidency of the Pennsylvania Steel Co., the first concern in the U. S. to embark in the manufacture of steel rails. Of this company he has since remained the head. He also retained the presidency of the Delaware Railroad and of several other connections of the Philadelphia, Wilmington & Baltimore, and was for some time the managing director of the Lehigh Navigation Co. and one of the managers of the Reading.

Mr. Felton was one of those who began the Northern Pacific Railroad, and laid the foundation of the City of Duluth. He served as vice-president of the Lake Superior & Mississippi River, and as one of the directors of the Northern Pacific. From 1873 to 1883, he was a director of the Pennsylvania Railroad, and took an active share in its management, especially as the chairman of its Committee on Road.

Mr. Felton died Jan. 24, and was buried Jan. 28, 1889, in Woodlands Cemetery, near Philadelphia. His funeral was attended by many men eminent in business, politics and the professions; and thus has closed a career which is a part of the history of the nation.

Riehle Testing Machine.

We illustrate in this number a Riehle screw power vertical testing machine of 60,000 lbs. capacity. It is quite similar in arrangement to the 100,000 lbs. machine described in our issue of Jan. 25. The dimensions are as follows: Height, 6 ft.; length, 8 ft.; width, 2 ft. 5 in.; weight, 3,500 lbs. It is arranged to take in tensile specimens 8 in. or less, with 25 per cent. elongation for 18 in. specimens, or more for shorter lengths; round specimens, 1 1/4 in. in diameter or less; square specimens, 1 1/4 in. square or less; flat specimens, 2 1/4 in. x 1 in. or less; transverse specimens, 20 in. or less to 6 in. long; compression specimens, 8 in. long or less; compression surfaces, 6 in. in diameter. The motion of the pulley head is 23 in.

The speeds for this machine are as follows: Maximum speed for testing and light test 4 in. per minute; quick speed for testing, 1 in. in one minute; minimum speed for testing, 1/4 in. per minute, or 1 in. in 10 minutes; intermediate speed for testing, 1 in. in 3 1/2 minutes; maximum reverse speeds, 4 in. per minute; minimum reverse speeds 1 in. in 3 1/2 minutes.

This makes in all four different speeds with which specimens can be stretched or broken, and two for driving in opposite direction.

Power is applied by levers for starting, stopping and reversing, and also for changing the speeds. The machine is arranged with patent vernier poise, and the Riehle patent

wedge grip. The anti-friction bearings have hardened steel balls.

A testing machine of this description of 60,000, 100,000 and 200,000 lbs. capacity can generally be seen at Riehle Bros. Works, Ninth and Master streets, Philadelphia.

The Presidents' Meeting at Chicago.

The presidents of the principal roads west of Chicago met in that city Jan. 24, for the purpose of discussing and perfecting the traffic agreement recently made at New York City, and reported in the Railroad Gazette Jan. 11, page 23, and Jan. 18, page 40. President Adams, of the Union Pacific, was unable to be present, and President Hughitt, of the Chicago & Northwestern, occupied the chair. The meeting resolved itself into a committee of the whole for discussion of details and making changes to adapt the agreement to various peculiar circumstances brought up by individual roads. Three or four roads were not represented on the first day, and sessions have been continued daily during the whole week, final adjournment, subject to the call of the chairman, having been taken Jan. 30. Much time was spent on the division of territory, and the objections of the Chicago, Burlington & Northern to signing any agreement which will hamper it in competing with the rail lines from St. Paul eastward via the Sault Ste. Marie have apparently not yet been overcome. This road, with the Illinois Central and Kansas City, Fort Scott & Gulf have not yet signed. The committee, consisting of Presidents Hughitt, Cable and Strong, is continued for the purpose of obtaining these signatures.

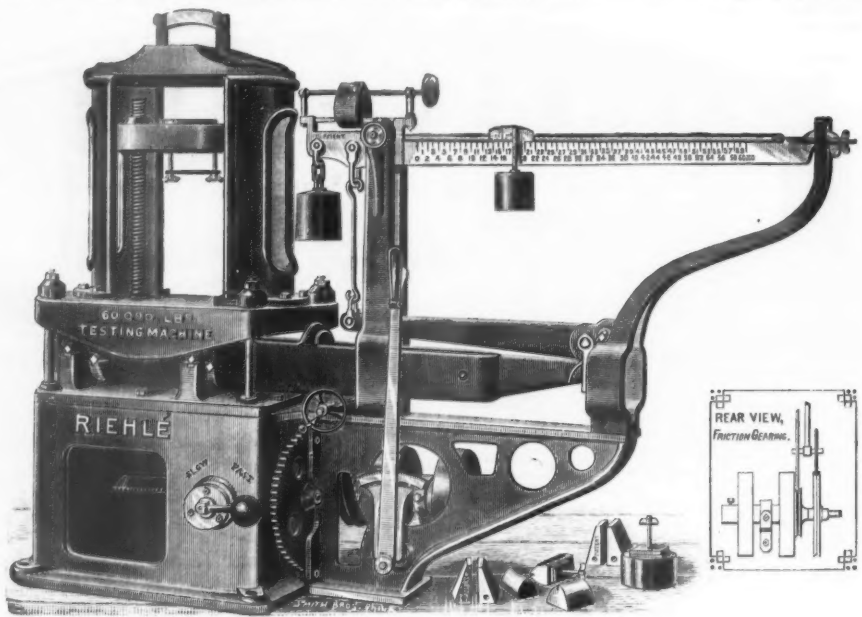
The choice of a presiding officer of the Executive Board had, according to the agreement, to be unanimous. After much discussion and canvassing of names of prominent Western traffic men, the meeting unanimously agreed upon Hon. Aldace F. Walker, of the Inter-state Commerce Commission. The two other members of the Executive Board who are to serve under Chairman Walker, provided he accepts, are, by resolution, to be elected by the Board of Managers.

In the amended document, which is now given to the public, the original agreement of the presidents, known as the agreement of Jan. 1, is taken from the body of the contract and placed at the head, as a prelude or introduction. This is followed by the articles of agreement, the first of which defines the objects of the Association and the second the construction of the board of managers.

Article 3 is amended to read as follows: A rate committee appointed by the Board of Managers for the freight and passenger departments shall be constituted, whose province it shall be to establish rates, rules and regulations on the traffic subject to this Association, and to consider changes therein, and make rules for meeting competition with outside lines. Their conclusion, when unanimous, shall be made effective when they so order; but if they differ, the question at issue shall be referred to the Board of Managers; and if they disagree, it shall be arbitrated by the Executive Board as hereinafter provided. Notwithstanding the decision of the arbitrators, the company claiming the right to make any particular rate may, after such decision, make such rate on ten days' notice.

Article 4, relating to divisions of through rates, is also amended. It provides that divisions of through rates shall be arranged through the Association, the intention being that bidding for business by means of private concessions shall cease, and that the divisions on corresponding traffic shall be opened to and alike by all lines; "provided, however, that when one road has a proprietary interest in another, the divisions between such roads shall be what they may elect, and shall not be the property of the Association."

Article 13 defines territory to be covered by the Association as follows: The business to be covered by this agreement shall be all the state and inter-state traffic, both freight and passenger, which is competitive between the parties hereto, or any two or more of them, which business has origin or destination in the states of Illinois, Iowa, Missouri, Kansas, Nebraska, Colorado, Wisconsin and Minnesota, and the territories of Utah, Wyoming, Dakota, New Mexico, Montana and the Indian Territory; except Pacific Coast business, now covered under the present agreement of the Transcontinental Association lines; Texas business, now covered under



RIEHLÉ 60,000-LB. TESTING MACHINE.

the present agreement of the International Association lines, and business between points north of the Ohio River and points south of the Ohio River, both of which are east of the Mississippi River.

The duration of the agreement is to be absolutely 90 days from Jan. 1, 1889, subject to 30 days' notice thereafter of the desire of any party to withdraw from or amend the same, and in case any such notice shall be given, the chairman of the Executive Board shall forthwith call the presidents together to consider the matter. A special article provides that the Wabash becomes a party to this agreement only for that portion of its road from Chicago to East St. Louis and Hannibal, via Tolono, Ill.

TECHNICAL.

Car Notes.

The Indianapolis Car & Manufacturing Co. has been awarded the contract to build 250 cars for the Cincinnati, Hamilton & Dayton road.

The Northern Pacific has let a contract for building 50 refrigerator cars to the Peninsular Car Co., of Detroit, Mich.

Ten new box cars for the Roanoke & Southern arrived at Roanoke, Va., a few days ago.

The United States Rolling Stock Co.'s works at Anniston, Ala., have just completed ten box cars, part of an order for 20 for the Anniston & Cincinnati.

Bridge Notes.

The Maine Central is building an iron bridge at Philips Lake, near Woodland, Me., to replace the existing wooden bridge.

The Berlin Bridge Co., of East Berlin, Conn., is erecting a new bridge across the Connecticut River between Brattleboro, Vt., and Chesterfield, N. H.

The County Commissioners will erect an iron bridge across Wichita River at Vernon, Tex.

At Fayette, W. Va., the Wrought Iron Bridge Co., of Canton, O., is building a bridge over the New River.

It is stated that an iron bridge is to be built over the Little Elk River, at Elkton, Md., by the Philadelphia, Wilmington & Baltimore road.

Hardin County, Ky., has appropriated \$6,000 for an iron bridge at White Mills, the work of construction to begin in the spring.

The Norfolk & Western has just finished an iron truss bridge of 64 ft. span over Back Creek, near Belping, Pulaski Co., Va. The bridge was made by the Edgemoor Iron Bridge Works.

The new iron railroad bridge, spanning the Navesink River, near Cuddebackville, N. Y., the Summitville Branch of the Port Jervis, Monticello & New York road, was finished Jan. 24.

Manufacturing and Business.

The Pacific Lock & Seal Co., of St. Louis, is having made by T. J. Swaine three stamping presses, in addition to the two already made for the company by the same manufacturer.

Morris Sellers & Co., of Chicago, manufacturers of the Samson splice-bar, will hereafter manufacture it in steel as well as in iron. It has heretofore been made exclusively of iron. The new departure in the manufacture has made necessary several alterations in the rolling mill. A 500 h. p. engine has been ordered of the Aetna Machine Co., of Warren, O., and the firm will also put up a heavier train of rolls than any now in use in the mill.

The Kansas City Bolt & Nut Co.'s works at Kansas City, Mo., are now in running order. The works consist of a rolling mill, spike and nut forging shop, bolt and washer shop, machine shop, etc. The company will manufacture bolts and nuts, washers, rivets, spikes, and also splice bars and merchant bar iron. J. H. Sternbergh is President of the company, J. C. Howes is Vice-President and Treasurer, and Hilary Misemer, General Manager and Secretary.

The Davy Chemical Works, of St. Louis, Mo., have moved to 121 Locust street. The top floor of the building is devoted to the manufacture of train cakes, for which the company reports an increasing demand.

The Carolina Oil & Cresoating Co., of Wilmington, N. C., is making additions to its works under the direction of F. C. Pringle, Engineer and Superintendent.

The Pennsylvania Steel Co., of Steelton, Pa., on Jan. 18, received an order for 200 of their switches. Nearly all the departments of the company are very busy. Preparations are being made for casting the bed plate for the new engine at one of the Bessemer mills. The casting will weigh about 30 tons.

A. R. Bowman, of St. Louis, reports among his recent sales a shaper to the Smith Feed Water Heater & Purifier Co.; two Vulcan hammers to the Missouri Car & Foundry Co.; one Lodge, Davis & Co.'s new style 17 inch Imperial lathe to the Laclede Car Co.

The Canton Steel Roofing Co., formerly the Canton Iron Roofing Co., of Canton, Ohio, has just completed a new plant, and have added improved machinery.

The Dunham Manufacturing Co., of Boston, sends a list of 21 railroads (including the most important lines in the country) from which the firm has received January orders for its freight-car door; also 9 roads ordering Globe ventilators and 18 roads ordering Keystone car-replacers. The firm considers the business of the new year as entirely satisfactory.

Messrs. P. K. Dederick & Co., of Albany, manufacturers of self-dumping coal buckets, tramway cars, hoisting machines, etc., are offering a steel barrow which has some very good features. The wheel is placed in such a position, under the tray, as to take a great deal of the load off the man's arms and shoulders, and place it upon the wheel. The trays are made of No. 14 steel plate; the bottoms are of No. 12. The sides and bottom are flanged and riveted together, thus giving the tray at the corners about double strength. The handles are tubular, made from a single piece of pipe. The legs are also made from pipe. The wheel has cast iron hub and rim, with wrought iron spokes and steel axle. The axle runs in cast iron boxes of good length. By removing eleven bolts, these barrows can be taken down; trays nested together; also handles, braces, etc., and securely packed for shipment.

Iron and Steel.

Charles Huston & Sons, of the Lukens Rolling Mills, at Coatsville, Pa., have contracted for a very large new steel plate mill. The rolls will be made by the A. Garrison Foundry Co., of Pittsburgh, while the train will be made by McIntosh, Hemphill & Co. The train will be driven by a 36 by 60 Corliss engine, to be built by Robert Wetherill & Co., of Chester, Pa. It will have a 50-ton fly-wheel, and the steel shaft will be 18 in. in diameter in the journals.

James P. Witherow, engineer and contractor, of Pittsburgh, Pa., who is building the new Bessemer plant of the Chester Rolling Mill Co., at Chester, Pa., has contracted with William Todd & Co., of Youngstown, O., for the

blooming mill engines, which will be of special design. This mill, when completed, will have a capacity of from 300 to 400 tons a day. Mr. Witherow has just completed a new stack for the Junction Iron Co., at Mingo Junction, O., and is also engaged in the erection of a new blast furnace for the Jefferson Iron Works, at Steubenville, O.; three new furnaces for the Bessemer Iron & Steel Co., at Bessemer, Ala., and also a new stack for Raney & Berger, at New Castle, Pa.

The Hamburg Rolling Mill at Hamburg, Pa., owned by the Philadelphia & Reading Coal & Iron Co., has been leased to Walter Nevegold, of Philadelphia. The mill has been idle for the last two or three years.

The name of the Johnson Steel Street Rail Co., of Johnstown, Pa., has been changed to Johnson Company. This company last spring erected a new rolling mill at Johnstown for rolling street rails.

Moorhead Bros. & Co., of the Vesuvius Iron Works, Sharpsburg, Pa., are now preparing to build a new puddling department of 20 double furnaces, and put in a new much train. A large retort is to be built to manufacture fuel gas.

The Aetna Machine Co., of Warren, O., has sold a 400 h. p. engine to the New Albany Forge & Rolling Mill Co. to drive a train of rolls in its rolling mill at New Albany, Ind.

The Lloyd-Booth Co., owners of the Falcon Foundry & Machine Works, at Youngstown, Ohio, is now building for Andrews Bros. & Co., of Youngstown, a lever shears for shearing car axles. It will weigh 50,000 lbs.

The Iron City Tool Works, of Pittsburgh, is running more than full time, and turning out a great number of picks for railroad work in the South and West.

At the recent annual meeting of the Cleveland Rolling Mill Co., the following officers were elected: President, William Chisholm; Vice-President, W. B. Chisholm; Secretary, E. S. Page.

The new blast furnace of the New River Mineral Co., at Ivanhoe, Va., recently put in blast, is equipped with two 60 by 16 ft. Whitall stoves, one blowing engine built by J. P. Witherow & Co., and two batteries of Heine boilers.

The Nashville Iron, Steel & Charcoal Co., which has operated extensive works in the new town of West Nashville, Tenn., has made an assignment. The liabilities are estimated at \$170,000, including bonds, and the assets are said to be \$100,000. Unpaid stock subscriptions are included in the assets. The company operated under the patents of the Standard Charcoal Company.

The steel plant of the Glasgow Iron Co. closed down last week, and it is understood that operations will not be resumed therein. It is possible that the plant will be rebuilt or changed to an iron manufactory.

The Rail Market.

Steel Rails.—Sales by Eastern mills are reported as follows: 12,500 tons at \$28.25 for delivery at Norfolk, Va.; 1,500 tons at private sale, and 2,500 tons for Chicago delivery, at a price equivalent to \$27.50 at mill. A Pittsburgh mill has closed a contract for 5,000 tons for Virginia delivery, with an option on 5,000 tons more. It is also stated that an order from a North Carolina road for 20,000 has been placed in Pittsburgh. The lack of business from other territory has led Pittsburgh and other Western mills to compete with the Eastern mills for Southern orders, and this has led to an unsettling of the markets, the quotations being nominally \$27@27.50 at Eastern mill.

Old Rails.—No sales are reported, and quotations are \$23@23.50 for tees.

Track Fastenings.—An Eastern road is reported to have placed an order for 8,000 kegs of spikes, delivered at Albany and Buffalo, at a price below cost, quoting, \$2@2.05. An order for 50,000 tons of steel angle bars, at private terms, has been placed by the same road. Angle bars are quoted at \$1.80@1.85 delivered.

Car Heating Notes.

The Timlin-Heidinger system is being applied to a train of the Rome, Watertown & Ogdensburg.

It is stated that the Southern Pacific, which has equipped a few engines with the Sewall system for the purpose of hauling the Montezuma Special, will proceed to fit up a large number of trains and engines with this system as soon as possible.

Strong Locomotive.

The Strong Locomotive, "A. G. Darwin, No. 1," constructed by the Hinkley Locomotive Co., and lately tried on the New York, Providence & Boston, is now running on the Susquehanna Division of the New York, Lake Erie & Western from Susquehanna to Hornellsville, a distance of 139 miles. The run is a notably hard one, and the engine is said to be giving great satisfaction. She takes express trains No. 1 and No. 8 on alternate days.

"Old Ironsides."

The Baldwin Locomotive Works has recently sent to the National Museum at Washington a miniature model of the locomotive "Old Ironsides," which was built by Matthias Baldwin in 1832. This was the first locomotive built by Baldwin. The workmanship is in all respects a perfect reproduction of the original. An inscription on the model states that this locomotive made 60 miles an hour. This was of course for but very short distances. In the same collection, illustrating the history of the locomotive, is the original John Bull. It may not be generally known to our readers that the section of transportation and engineering of the United States National Museum contains collections illustrating methods of transportation in all countries from the earliest times. It is the purpose to show, with great fullness, the development of the American and English system of permanent way, and of American and foreign locomotives and passenger cars, as well as of the methods of transportation by water. This section is under the charge of Mr. J. E. Watkin, Curator, who will always be glad to receive contributions or communications upon this subject.

Care of Steam Boilers.

Some instructions relative to the care of the Belleville boiler, issued by the French Navy Department, will be found useful, wholly or in part, by those having charge of other forms of boilers:

1. When a boiler is not in use it should be kept full of water.
2. Whenever a boiler is thrown temporarily out of use, either at sea or when arriving in port, it should be filled with water as soon as the fires are hauled.
3. To be assured that the boiler is completely filled, water should be admitted until it escapes through the safety valve.
4. The boiler should be examined at regular intervals, to ascertain whether any of the water has escaped.
5. If a boiler is to be inspected internally, it should be filled with water when the fires are hauled, and the water should not be discharged until everything is ready for the inspection. This rinsing operation tends to remove corrosive substances from the interior surfaces.
6. When under way, at least a pound of powdered carbonate of lime for each pound of cylinder oil used should be put into the well from which the feed pump draws its supply.

7. The use of vegetable and animal oils for cylinders, pump, and all parts in communication with the condenser or hot-well, should be avoided. Mineral oil alone should be used, and the engineer should ascertain, by analysis, whether the oil is free from all mixture with animal or vegetable fats.

Apparatus for Collecting Fine Dust.

Mr. Jouanny describes an apparatus which he uses in his shop to collect the dust of copper and tin escaping from the rolls. It consists of an inverted bell, immersed in a vessel containing water. The upper portion of this bell has a pipe connected with a fan, which forces into the bell the dust laden air, and round the lower portion are a number of small holes, about 0.2 in. in diameter. The level of the liquid is about 0.2 in. above these holes.

When the fan is started the water is depressed within the bell, and the air and dust escape through the small holes. In their upward movement the air bubbles through the water, which retains the dust, the latter sinking to the bottom of the vessel, by reason of its greater weight. A float maintains the water level constant, and there is a discharge cock to collect the precipitated dust.

This dust collector will be found useful in factories where the dust of precious metals is to be saved. On the other hand, from a sanitary point of view, it purifies air, carrying in suspension dust which is injurious to the workmen, and permits the removal of poisonous dust without discharging it into the external air, to the injury of animal and vegetable life.

The Latowski Steam Bell Ringer for Locomotives.

The Latowski steam bell ringing apparatus for locomotives, which was first brought to public notice in Germany about six years ago, has apparently met with considerable favor there, and is now in extensive use on a number of German roads. While the device has already been described on several occasions it may not be amiss to briefly repeat here that it consists essentially of a cast steel bell fitted over, and attached to, a steam chamber, the upper end of which is closed by a hinged valve. To this valve, the sounding hammer is fixed, the arrangement being such that the bell is struck on the outside. On admitting steam to the chamber, it is evident that when the pressure reaches a high enough point the hinged valve with the attached clapper will be raised, and allow a portion of the steam to escape into the atmosphere. The pressure in the chamber being thus reduced, the valve drops back to its seat and causes the clapper to strike. The rising steam pressure then again raises the valve, and the same action takes place, being repeated over and over again until steam admission to the chamber is cut off. Four or five pounds working pressure in the steam chamber are sufficient, the strokes occurring in uniform time. The apparatus, we learn from German sources, is made in three sizes for standard and narrow gauge locomotive, and for steam street railroad engines, and those used in manufacturing establishments. Altogether about 2,500 of the bells are now in service. With few exceptions they are fitted to the roofs of the cabs. Where circumstances do not admit of thus placing them, a special design has been adopted, in which the steam, after having lifted the valve, does not escape into the open air directly, but is led into the stack or is used for heating the feed water. One of the advantages of the apparatus is, that when once started it will ring uninterruptedly and without requiring attention until the steam supply is cut off. The importance of this feature, under some conditions, will be readily appreciated. The device has also been extensively introduced on German ferry boats for signaling purposes; and, furthermore, is used as an alarm in connection with turn-tables, as, for example, in the main station at Frankfurt-on-the-Main. From all accounts the six years' experience with it has proved eminently satisfactory and has recommended its general adoption.

A New Tunnel Under the Chicago River.

The West Chicago Street Railroad Co. has announced that it will soon begin the construction of a new tunnel under the Chicago River, to cost \$1,500,000. The tunnel will be a third of a mile long and will be just north of Van Buren street, four squares from the company's other tunnel connecting the South and West divisions at Washington street. The object is to accommodate the cars of the West Side system, which now run on Adams street and south of that point. All cars north of Adams street will go through the Washington street tunnel.

THE SCRAP HEAP.

Notes.

Bauereisen, the leader of the Burlington strikers, who was arrested for complicity in the plot to wreck trains by the aid of dynamite, and who was recently convicted in the county court at Geneva, Ill., is reported to have gone to prison. His case has been appealed, but it is said that he has no hopes of escaping the State Prison.

Strikes of brakemen have been reported the past week on the New York, Chicago & St. Louis, at Buffalo, and on the Lake Erie & Western at Lafayette, Ind., but both appear to have been quickly settled.

The Cleveland Leader publishes a letter which it has received from a Chicago ticket broker, offering to buy 1,000-mile tickets, passes, etc. The letter names prices for mileage tickets on the prominent roads of the West varying from \$10 on the Chicago & Atlantic, to \$17.50 on the Chicago, Rock Island & Pacific. For most roads \$14 to \$16 is the rate.

Accident at Crewe.

At the London & Northwestern shops at Crewe, on Friday last, a large crane carrying a ladle containing seven tons of molten steel collapsed and the ladle fell into a pit. Masses of the steel flew in every direction and twenty men were severely injured. The roof of the building was torn off.

Mutual Benefit Associations.

The Employes' Mutual Benefit Association of the Staten Island Rapid Transit Railroad has just issued its first annual report. The membership is now 462, and the receipts for the past year have been \$2,246. The railroad company has paid the printing bills and expenses of organization, and the balance in the treasury at the end of the year is \$204. The officers are: W. O. Sprigg, President; A. E. Braisted, Vice-President; Frank S. Gannon, Treasurer; W. H. Prall, Secretary; R. N. Stevens, Corresponding Secretary; M. A. Lovell, W. Freeman, W. H. Brooker, Executive Committee.

The officers of the Employes' Mutual Benefit Association of the New York & Northern for the ensuing year are: C. A. Coombs, President; H. H. Vreeland, Vice-President; L. J. Maher, Secretary; L. J. Maher, Corresponding Secretary; Frank Geraghty, Treasurer; H. C. Moore, Thos. Millen, M. T. Mangano, Executive Committee.

The Brown & Sharpe Mutual Relief Association, composed of the employes of the Brown & Sharpe Manufacturing Co., of Providence, R. I., has just issued its annual report. The association was organized in 1886, and consists of two divisions, one of those receiving \$8 per week or more, and the other of those receiving less than that. The latter class is only one-sixth as large as the former. The dues in the first class are 5 cents per week, in the second 2½ cents. The membership is 307, an increase of 54 during the past year. The number of days' benefits paid during the year was 668, and the receipts were \$715.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Webb compound locomotive for the Pennsylvania was landed at Philadelphia the 28th inst. This engine is, we believe, a very close, if not an exact reproduction of the "Marchioness of Stafford," which was illustrated in *The Engineer*, Dec. 21, 1888. The intention of the officers of the Pennsylvania is to try not only the compound principle, but an English locomotive, and therefore no departure has been permitted from the London & Northwestern type in the smallest details. Even the cow-catcher and the American head light are wanting on the Pennsylvania compound. Moreover, an experienced man from the London & Northwestern has been engaged to run this locomotive, and a machinist from the shops of the builders comes over to see that she goes into service perfect in every detail. There can be no doubt that the locomotive will be run with the most scrupulous attention to every detail, and with the sole purpose of finding out the comparative efficiency and economy of this and the standard Pennsylvania engines. The results, therefore, of the experiment will be of real scientific value.

Hot water for car heating has, it is true, its difficulties, but it has its advantages also. With it a longer time is required to warm a car, it is harder to circulate and may be more dangerous in case of accidents. It is, however, more even in its radiation of heat, and the fluctuations in the temperature of the car are less. If the engine is disconnected, or if steam is shut off for any purpose whatsoever, the car remains comfortable much longer. But there is one further difference which was indirectly pointed out by Mr. Schroyer at the Western Railway Club. He stated that, with direct steam, when there is sufficient pipe to warm the car satisfactorily in cold weather, there will be too much pipe in warm weather. One might go a little further and state that, whatever be the amount of piping in the car, as soon as an attempt is made to cool the pipes below 212 degrees, a difficulty is at once encountered in the case of direct steam heat. As long as steam has any pressure whatsoever, its temperature will be 212 degrees, and, therefore, if, at the drainage end of all direct steam pipes, we desire to obtain heat for warming the car, there must be some pressure, if only one-eighth of a pound; otherwise, the pipes will have almost no heating effect. When there is pressure in the pipes the temperature will be at or near 212 degrees. It may be much as stated by Mr. Schroyer—"we either have too much or too little heating effect from direct steam." Now, this is not true of the water system, because the water can be caused to maintain any temperature from a freezing to a boiling point. This we well know from observation in parlor cars heated with hot water. There is a marked difference between cars heated with hot water and with direct steam to be noticed as one passes through a long train containing cars heated by both systems,

This difference has been attributed to the moisture in the water system, and to the dryness of the direct steam system, but this, of course, is merely a commonplace and false notion induced by other conditions than that produced by the heat itself. The fact is that the cars heated by direct steam, under the management of brakemen, are generally overheated. Steam heated cars, are, in general, those day cars at the front of the train, which, in all trains, lack ventilation. The overheat and lack of ventilation incline one to favor the water-heating system as felt in those cars which, under the management of porters whose sole duty is the comfort of the passengers, are less crowded, better ventilated and otherwise more comfortable. We cannot say, and do not say, that direct steam heat cannot be graduated so as to be as uniform in mild weather as the heat from water systems, but, so far, there has been no general attempt made to accomplish this much desired end; one line of railroad has, however, just commenced experimenting in this direction. Automatic temperature regulators will in the main tend to make steam heat more uniform, in temperature, in the average throughout the car, but will have almost no control over the differential temperature, in the car, unless several points of admission or more than one continuous coil be used. The Chicago, Milwaukee & St. Paul system was designed to meet this difficulty, and has a separate coil for use in mild weather, over which the air for ventilation passes.

The decision of Judge Brewer of the United States Circuit Court, in the case of certain Iowa merchants against the Rock Island and others, which was noted in our last issue, is a somewhat serious matter to the railroads. It involves a refusal of the national judiciary to interfere with the state courts in suits for alleged violation of the state railroad law. It has commanded much attention, because Judge Brewer has been a fearless and effective protector of the rights of corporations in certain cases where they were severely threatened by legislation. If he does not interfere in this matter it is pretty sure that no one will. We suppose that the result was inevitable, but it is none the less an unfortunate one. The conflict of jurisdiction between the nation and the individual states is working badly for the railroads in a great many ways. Both parties claim the power to control; neither can be effectively appealed to for protection. Cases like this may give solid ground for the demand for incorporation of railroads by national instead of state authority. Such a scheme would involve a pretty radical change in certain legal traditions, but it may become necessary under pressure of business facts. If the United States Government assumes rights of control and at the same time disclaims powers of protection, something must be done to give railroad property security in the latter respect to compensate for its losses in the former.

The opinion of the Inter-state Commerce Commission in the matter of passenger rate wars is in line with its previous utterances on the same subject. It is stated that this business is managed in the interest of the agents themselves, rather than that of railroad investors and owners; that cut rates are met, even when the loss from so doing is greater than any possible gain to the companies; and that much of what has been done violates the dictates of self-interest as well as the principles of the Inter-state Commerce Act. The Commission urges that the law be amended in such fashion as to define more clearly what are excursion and commutation tickets; that the payment of commissions be made illegal, and that the carriers be required to make provision for prompt redemption, at fair rates, of unused portions of tickets. Of the wisdom of these recommendations, especially the first two, we have no doubt. The practicability of defining the term "regular agent," and of constructing a law which will effectually stop all payments to ticket sellers except in the form of a fixed salary, is indeed yet to be tested, and making it illegal for one passenger to sell his ticket to another is a provision which will surely be obnoxious in its inflexibility, but the aim is in the right direction. Of the universal folly of passenger agents in making cuts in rates, we are not quite so sure. It is a rather bad thing to carry passengers at about half what it costs; it is sometimes a worse thing to carry no passengers at all, and run your trains empty. It is only by joint action that the difficulty can be met.

The Chicago Car Service Association has, after much controversy, carried one case to the courts and has got a decision, but the main question seems not to have been clearly brought out. The gist of the decision, which was by Judge Bradwell, is that for

delay in unloading cars a railroad company has no lien upon the goods, but must secure its rights through an action in the courts for damages. Holding the goods is illegal. The old claim that "demurrage" is legal only in connection with carriage by water was brought up, but as many decisions were quoted against as in favor of that view. The consignees in this case, who are coal dealers, claimed that the coal arrived irregularly. The defendant, the Chicago & Eastern Illinois, brought evidence to show that the average time between the mines and Chicago was 3½ days, the average time consumed in unloading 5½ days, and that cars did not arrive irregularly. The plaintiffs, however, brought out some evidence contradicting the last point. It was claimed that the coal company, with 5 cars standing on the side-track, unloaded less than one car per day. To show the reasonableness of the charge of \$1 per day the railroad showed that the cost of its team track yard at Twelfth street, including only the ground and track, was \$328,482. This space has a capacity of 83 cars, and the cost per car space is, therefore, \$3,903.55. The interest on this investment at six per cent. amounted to 77 cents a car per day at 309 working days a year. The average earning of all the company's coal cars was 98 cents each working day. The road claimed that as the track room cost 77 cents a day and the delay of the car cost 98 cents, a charge of \$1 was not exorbitant. The agitation of this matter at Chicago has produced at least one improvement in the service, the shortening of the time wasted in delivering some of the bulk freight. The lumber dealers have heretofore been notified by mail of the arrival of freight, and 24 hours were thus thrown away in nearly every case. By agreement between the dealers, the railroads are now to send notices of arrival to the Secretary of the Lumber Dealers' Association, whose office is centrally located, and he will advise firms by telephone. This is a simple expedient, and really should produce a material saving in the time of cars. The wonder is that so obvious a facility should have remained unused heretofore.

With the close of last year, the English Railway Commission created by the Act of 1873 ended its labors, and was supplemented by its successor under the Act of 1888. There were some flowers (figuratively speaking) at the funeral service, but very few mourners. The old commission was, on the whole, a failure, in spite of the character and intelligence of its members. It did not create anything like a body of transportation law. It was not very effective in checking discrimination or in securing railroad reform of any kind. Its decisions were not at all uniformly sustained on appeal. Its powers of enforcing its orders or even for protecting complainants against retaliation on the part of the railroad companies were very limited indeed. The nominal power of the English commission was greater than that of the Inter-state Commerce Commissioners; its real influence was very much less. It was content to follow in the old traditions furnished by the courts, to base rates entirely upon cost of service, and to enunciate principles which could not be carried to their logical conclusion without destructive consequences. It simply assumed the position of a court whose only effort was to shorten practice and simplify the methods of relief for shippers. The mistake was soon obvious. Though it assumed the powers of a court, it did not possess them. The courts themselves looked with jealousy upon the assumption of judicial powers by a body of this kind. Some of its decisions were overthrown; others were allowed to remain for a long time unenforced. Appeals were multiplied with each succeeding year. The courts insisted upon reviewing the whole record, and investigating some of the points which the commission wished to treat as final. In the long run procedure under the new system was about as slow and costly as under the old. Two methods of reform were open; either to give moral weight to the decisions by bringing the law as they interpreted it into harmony with the principles of good railroad economy, or to change the technical constitution of the commission in such a way as to make it an integral part of the judicial system of England. The Act of last year does more in the latter direction than in the former. It provides for the association in the sittings of the commission of a high judicial officer of England, Scotland or Ireland, as the case may be. It also strives with some success to limit the right of appeal. It remains to be seen how far these changes will accomplish their object. Two of the three members of the old commission have been continued in the new one. Any

radical change of policy is therefore out of the question. Under these circumstances we have some fear that the trouble is too deep seated to be cured by any mere change of machinery, however carefully devised.

Runaway Engines.

From time to time we hear of accidents caused by the running away of locomotives that have been left standing alone on side tracks. It is generally alleged that these accidents are due to the opening of the throttle valve through some mysterious influence, or the jars caused by the passing of another engine. Most of such accidents take place with switching engines, or with engines in that class of service. The popular idea is that a locomotive will start if the throttle valve is opened; this is not the case, because an experienced engineer will invariably place his reverse lever in the centre of the quadrant when leaving his engine. With the reverse lever in this midgear position there is not one engine in a thousand that would start though the throttle were opened wide, and if it did start it would not have power enough to do any damage. One of the reasons why accidents of this class take place principally on switching locomotives is that the men in charge of such locomotives are not selected or instructed with so much care as those running on the road. It is simply impossible for a jar of any sort whatever to remove a reverse lever which has been properly placed in the quadrant, and it is only those throttle levers which are of inferior design, or which are in bad condition, that will open under the influence of jars or shocks. In order to explain why locomotives will start with no one upon them we must assume that the reverse lever is either in forward or back gear; that is, it is improperly placed on the quadrant by the engineer who leaves the engine standing unattended. With the reverse lever in this improper position the locomotive is liable to start, particularly if the cylinder cocks are closed. If the cylinder cocks are closed and the throttle leaks, as many throttles do, the steam passages soon fill with steam at boiler pressure. The throttle valve, which is a balanced valve, being loose on the stem, is now free to open with the slightest movement of the throttle lever, because it has equal pressures on the top and bottom sides. The throttle levers of switching engines are placed, almost invariably, above a horizontal position, and in many cases incline at an angle of 45 deg., the handle being higher in the air than the throttle stem. The throttle lever is, therefore, in a position where a passing engine or a slight blow on the front or the rear of the engine would jar the throttle lever down from this inclined position and thus tend to open the throttle valve. Particularly would this be the case if the stuffing boxes were not tightly set up on the throttle rod. There is still another reason why throttle levers may open when the engine is standing still, and that is the area of the throttle lever rod acts like a piston in a cylinder; the steam pressure on the interior end of the throttle rod tends to blow the rod through the stuffing box. This pressure on a large rod amounts to about 120 pounds, and if it should happen that the throttle lever was unlatched, or the latches were badly worn, the stuffing box not packed tight against the rod, and the throttle valve should be leaky, there is but little doubt that the throttle would open considerably. The only remedy against "runaway" engines is to place the reverse levers at the dead centre in the quadrant, and then serious accidents from "runaways" are simply impossible. We have just received notice of a serious accident in Virginia from a runaway switch engine which attained a speed of sixty miles an hour. If the reverse lever had been properly placed when the engineer left the engine such a speed could not have been reached. While the cause of such accidents is generally attributed to the accidental moving of the throttle lever, without fault of the engine runner, yet the truth is more often that the engineer has neglected to properly place the reverse lever before leaving the engine.

The Tallmadge Collision.

The circumstances attending the butting collision near Tallmadge, Ohio, Jan. 14, which was briefly reported in our issue for that week, were somewhat complicated, and we have deferred comment until the facts were more fully brought out.

It will be remembered that west-bound freight 81 broke in two several miles east of Tallmadge, that the engineer took a portion of the cars to that place, set them off, and returned for the remainder. He left

his fireman at the station for the reason that the brakeman was less experienced than he. The engineer was not to come to the station with the cars, but told the fireman that he would pull into the nearest end of a long side-track (of which the switch was a mile east of the station), thereby getting out of the way of the passenger train a little sooner than he otherwise could. This partially explains why the fireman so readily assumed that the track was clear for the passenger train, before he had seen his own train. The fog was dense and he had to depend solely upon his hearing; the whistle was blown at a point over two miles away from him, whereas if the train had been on the turnout it would have been within less than one mile. How he could fail to notice that the engine was much further off than it should be has not been satisfactorily explained. The night was still, and the dense fog very likely tended to deceive, and other complications, mentioned further on, perhaps aided this deception; but yet it is strange that one so careful in other respects as this fireman seems to have been, did not have his suspicion aroused. The whistle signal for calling in the flagman from the other way (east) was four long followed by one short blast. This the engineer says he gave, but the rear flagman corroborates the assertion of the fireman that the four long blasts were given without the short one, thus calling in the fireman. The rear flagman did not come in until he was called by some one on the caboose shouting to him. Still other testimony supports that of the fireman, and yet the evidence that the engineer sounded the correct signal is strong. The engine had only 100 lbs. pressure in the boiler and the blasts would therefore not be very loud. Engines on other roads were whistling within two or three miles, and the night was still, so that whistles even five miles away were heard distinctly; the engineer of the broken freight sounded the back-up signal twice, and one of these may have combined with a blast from some other engine to make the four-blast signal. All these possibilities produce complications which may never be cleared up.

The separate signals for calling flagman from opposite directions have been in use on the road for nearly a year, and are therefore familiar; the fireman is a young man, say 25, and is not only experienced on the road and in the work, but is bright and alert. The problem involved in the prevention of such blunders in the future is, therefore, by no means the simple one that it often is in train accidents. It is sadly true that dull or sleepy men, or those afflicted with ignorance which the most ordinary superintendent could have discovered, are at fault in a great many collisions; but evidently this was not the case here.

The last class of mistakes to be guarded against and, if possible, prevented, those which in some small degree—no one knows how small—occur in the experience of the best men, can be dealt with only by having superior officers who know their men intimately. The division superintendent who has two or three hundred miles of road and a large train movement, with the attendant perplexities in the financial department, can never fill this requirement. Any general manager of experience on a large road knows this—in fact, presidents also, if they have given any attention to these details, must be well aware of the truth of the general principle here applied; but from the practice of most roads it must be assumed that these officers do not succeed in impressing it upon the majority of the directors (who appropriate the money). A proposition to double the force of division superintendents and train masters would strike the average directors' meeting as preposterous, and yet it is the first step in the only rational remedy for some of the most distressing occurrences in railroad operation. The Erie system has undergone many changes of management and has undoubtedly suffered therefrom. Changes, even for the better, involve delays which are often practically fatal to the most necessary improvements. Stability of administration is one of the largest elements in success, and there can be little doubt of the influence of this in the morale and efficiency of the personnel as well as in more obvious features of management; but to elucidate it in a particular case is hardly less difficult than to convince the investors in a road that its interests demand a sacrifice of a quarter or a half of their dividends for a year or more. Much less could we think of placing the whole blame for an imperfect organization upon the latest management.

This disaster is not lacking in lessons of detail. One of the trunk lines had quite a smash-up a few months ago from a flagman coming in when the flagman from the opposite direction was recalled. There it appeared to be sheer stupidity; but it suggests a

source of trouble. There is too much calling in of flagmen, and occasionally a collision results from the following train arriving just as the man gets in. Possibly the practice of calling in flagmen by whistle could be greatly abridged without detriment to the service. Perhaps there is too much anxiety to get the men all home on time. Certainly the forward flagman need not be called in by whistle very often, as unnecessary stops caused by him involve the minimum of delay.

The block system provides against collisions of this kind, but the presence of switches in the main track at points remote from stations, as at the east end of Tallmadge siding, is just the feature that constitutes one of the greatest elements of danger in working the block system. One of the most important preliminaries to the introduction of this improvement is the concentration of main track switches near the ends of the blocks.

The lesson of "the deadly car-stove" in this accident should be too plain to require a word. If the three unnamed Chinese and the friendless orphan had been prominent citizens, public sentiment would have demanded continuous heating at once on every road in the country, rich or poor, and regardless of whether the death of the victims resulted from the fire or from the collision. By great good luck the company escaped in this case with little censure from the public press; but it should be remembered that the public opinion which finds expression in legislation is growing steadily, and that it is becoming daily more difficult to demonstrate to legislators that there is no satisfactory coupler or safe and adequate system of continuous heating yet in the market.

The Security of Railroad Investments.

At the last meeting of the New York State Bar Association, Daniel S. Remsen read an unusually able paper on this subject. While criticising severely the faults of railroad management, he does not make the mistake which some others do, of supposing that these faults are due chiefly or wholly to the wickedness of the directors. He sees that the investors and the law are both to blame. Investors do not exercise ordinary care in the selection of securities; the law offers few safeguards against directors' misconduct.

In the latter respect England has a decided advantage over America. The varying legislation of our different states has rendered systematic development of these safeguards almost impossible. One of the most striking features of railroad laws in this country is their liberality towards the managers of the corporations, whose powers are great and often disastrous. "They are usually elected for one year only, but their policy may govern the road for a hundred years. Thus in many states in addition to the operation of the road they may make by-laws, leases and consolidations, declare dividends, guarantee bonds, increase and issue stock and bonds for money or property at or below par, build extensions and branch lines, aid in the construction of other roads, purchase stock and bonds of other corporations and even in some instances purchase lines of steamers without the formality of a meeting of the stockholders." In many of these matters reform is certainly possible. The power of directors to issue bonds should unquestionably be subject to a permissive vote of the stock. But in general stockholders have no voice in such matters. Even in states like New York, where some attempt at safeguards has been made, the restrictions are not very effective, either upon the method of issuing such bonds or the amount which can be put upon the market.

Consolidation, in its direct bearings, has been controlled by law in some states; but in most of these cases provision for the protection of non-assenting stockholders is conspicuously absent. Often the laws against consolidation can be evaded by a system of leases. In this respect the power of the directors is almost uncontrolled; and the chance for subsequent issues of new stock in exchange for that of the leased lines puts a premium upon breach of trust by the directors. Equally dangerous is the power to guarantee bonds and obligations of other companies. Strange as it may seem, "the number of states where the stock must be consulted before such burdens are assumed can be counted on the fingers of one hand, and the states in which the amount of such guaranty is limited are only about half as many." The unlimited power of directors to declare dividends is not perhaps so dangerous to investors, for the dividends which are paid go to the stockholders themselves. Yet the present practice of making the amount somewhat arbitrary, and of giving no previous notice, enables the directors, whenever they so desire, to speculate in their own stocks. "The first intimation on the subject generally

is that the customary or other dividend has been or has not been declared, and that the market value of their holdings is greater or less as the case may be. Even if some modification of the English system, giving the stockholders a voice in the matter, should not be adopted, it would at least be eminently proper for an official statement to be made to the stockholders before a dividend could be declared." The power of the directors to keep facts concealed is in many states almost unlimited. They can even prevent stockholders from having access to the books and papers of the company.

There have been some efforts at securing minority representation in the board of directors. The cumulative system of voting allows a stockholder as many votes as he has shares, multiplied by the number of directors to be elected, so that he may cast all his votes, if he pleases, for one director and prevent a bare majority of votes from electing the whole board. This plan has been adopted in some states, while others limit the number of votes, or voting power of any one person, and strive to check the abuse of proxies.

Some of these evils might be prevented by direct legislation, others by giving railroad commissioners greater authority. But prevention is easier than cure. When it comes to a remedy for an abuse already developed the case is more difficult. We cannot wholly agree with Mr. Remsen in what he says in this part of his paper. He treats at length both receiverships and rate wars. Receiverships have, as he says, been a great scandal. They are often made a means of keeping the bondholders out of a voice in the management, and the bondholders are thus forced to enter into the reorganization on unfair terms. "If," says Mr. Remsen, "as soon as default occurs the trustees elected by the bondholders became entitled to and received immediate possession of the railway, it would necessarily be operated for their security." When the stockholders have made default he thinks that the bondholders should at once be intrusted with control. They would then have the property and the income; and the stockholders the right of action, if any. The property could be put up at auction, and if the amount brought exceeded the amount of the bonds the surplus could go to the stockholders; otherwise the property should belong to the bondholders, and their bonds would thus be converted into stock. If the railroad then stood in need of further money a new loan might easily be placed.

This is Mr. Remsen's plan, which looks well in theory, but would hardly work in practice. The trouble is this: It will often happen that there are separate mortgages on different sections of the road, and separate rights to terminal facilities. If these complications could be prevented, the matter could be carried out in the simple way he has suggested, and with much more justice and with less trouble than under the present scheme. But the matter is not thus easily settled. These complications have not been prevented; they do in fact exist. The right to operate one section of the road, with connecting lines under a different and perhaps hostile management, is often of doubtful value. Each piece of property is necessary to the successful operation of the whole. The owners of each section have it in their power to stand in the way of the others. Little or no money can be raised until these conflicting claims are settled. If the bondholders under separate mortgages took possession separately, the value of the property as a whole would often be destroyed. This unfortunate set of facts has created the need for receivers and for receivers' certificates. It is true that the abuse of this system has been a cause of great evils. Any policy with regard to railroad securities which can prevent it will be most useful. But when once the conflicting claims have been created, we hardly see how any such short cut as is here proposed for their settlement can be made to work.

The problem of preventing rate wars is equally difficult. If no parallel lines had been built and all railroads were operated with the interest of the stockholders in view, it would be comparatively easy for any individual railroad to prevent abuses of power on the part of its agents. But parallel roads do exist; and if they are acting recklessly they can, in a measure, force sounder roads to follow their example. It sometimes involves much worse loss to avoid meeting the cut than to meet it directly. It is not quite fair to say that the manager fights his opponent by wasting his stockholders' property, for there are many conditions in which that property suffers more loss by a conservative rate policy than by a vigorous one. We do not mean to take direct issue with what Mr. Remsen says on this subject.

We agree with him that it is in the highest degree desirable that stockholders should hold managers accountable for reducing rates. The enforcement of such responsibility would be useful as far as it goes, but we cannot think that it would meet the whole difficulty. Perhaps it is not fair to Mr. Remsen to imply that he himself holds that opinion. Like every other student of the railroad question, he believes that such control will be effective chiefly as it secures publicity. Only by such publicity and the responsibility which it secures can any permanent reform be accomplished. So far as the present association of bankers and railroad presidents can secure this result, it will unquestionably succeed. So far as it aims to meet the existing evils by specific prohibitions and penalties, we fear that it will find the means at its command inadequate to secure the end proposed.

The Increase of Stock of Connecticut Roads.

Two propositions for increase of capital stock are now before the Connecticut Legislature—one on the part of the New York, New Haven & Hartford, the other from the Housatonic, which is controlled by the New York & New England. The motives of the "Consolidated" road seem straightforward enough. The management has two distinct objects in view—reorganization and improvement. It desires, in the first place, to readjust its relations to the leased lines by exchanging, as far as possible, their securities for its own. The leased roads are four in number—the Nautuck, with a capital stock of \$2,000,000 and a guaranteed rental of 10 per cent.; the Shore Line, with a capital stock of \$1,000,000, and a rental of about 7½ per cent.; the Air Line with a capital (preferred) of about \$3,000,000, and a guaranteed rental of 4 per cent.; and the Northampton with a capital stock of \$2,460,000, and a rental which will amount to 4 per cent. in the immediate future. None of the lines except the Northampton have a large bonded debt. The leases were for ninety-nine years from their original dates. The amount of money directly involved is not large, being decidedly less than the amount annually distributed in dividends by the main line, but, as is the case in every lease of this kind, the question of improvements makes trouble. On the Air Line, especially, large amounts must be expended for this purpose in the immediate future. If the stock of the leased roads, or a large portion of it, could be converted into consolidated stock, these difficulties would be obviated. On broad grounds of public policy it is rather desirable that such an exchange should be made, because anything which puts the ownership and the management of complicated systems into closer contact is a good thing. The bill before the Legislature seems to guard against possible abuses by compelling judicial authority to pass upon the terms of the exchange, and allowing non-assenting stockholders to stay out, if they prefer. We only fear that it will be difficult for the two parties to agree upon satisfactory terms.

The question of improvements on the main line involves another set of issues. The work of four trackings, which is now going on, was at first paid for by an issue of four per cent. bonds, which now command a considerable premium. But a more advantageous method for the stockholders seems to be in prospect. The charter of the road limits its dividends to ten per cent. annually. But it is earning more than this; so that if it can issue new stock *pro rata* to its stockholders at par, the stockholders have the prospect of a good ten per cent. investment. Whatever opposition there may be to the scheme is probably due to this feature. The amount actually divided under the new system would undoubtedly be greater than under the old. Those agitators who hold that all money earned by a railroad is so much loss to the public will naturally fight the proposal in the Legislature. But those persons who know how the attempt to limit profits defeats its own ends, and who believe in encouraging railroads to extend their facilities, will probably look upon the change with favor. The bill submitted seems to make full provision for the actual payment of the face value of the new stock, and, as far as possible, for its *bona fide* investment. It is peculiar in fixing no limit as to the amount of possible issue. While we see no particular objection to this feature, we doubt whether the Connecticut Legislature will look at it in the same light that we do.

What the Housatonic wants is not so clear. Not the mere power to increase its capital stock, for it did that on a large scale a short time ago. That the management would like to build a parallel line to New York is probable. That they would like to do it with their own money is not so sure. There have been plenty of people who wanted to parallel the N. Y., N.

H. & H. with other people's money, but very few who cared to risk even the moderate amount of their own which was required by the general railroad laws of the state of Connecticut. We suspect that the Housatonic directors have some project which they wish to yoke with that of the N. Y., N. H. & H., so that both will succeed or fail together. If that is the case, our advice to the management of the New Haven road is to insist that the two be made as exactly alike as possible. Let the Housatonic road be allowed to issue new common stock *at par*, and let the Legislature make sure that the money is actually paid in. Then let them build a parallel railroad on those terms—if they can. The essential difference in the requests of the two companies would at once become apparent.

Superintendents Who Can Instruct.

A certain letter in another column is dated at St. Louis, but as the evil which forms its subject is to be seen in all parts of the country, the reader (unless he resides in the Southwest) will do well to forget the locality from which it hails.

In the editorial of Jan. 4 we referred to the instructor and to the difficulty of finding a suitable person to fill the place. We said but little about the position because if the importance of the work is once appreciated the selection of a man who can do it should be recognized as a first feature of the work. Bright superintendents know how to instruct agents, for they have done it themselves. The first difficulty, though perhaps not the worst one, in getting a good instructor, is to get the money with which to pay him; and the best method of doing this is not now under discussion.

As our correspondent assumes, the instructor must often be the division superintendent himself. It is true that many, perhaps most, of the accountants sent around to check up the books have but imperfect ideas of the general work of the station agent. The latter is in a constant dilemma between following the instructions of the auditor and granting various concessions to the public which violate those instructions. Advice as to how best to attain the golden mean should, therefore, come from one of judicial mind not over-influenced by either side. The agent must sometimes stretch the auditor's rules somewhat, and the superintendent, or his lieutenant, the inspector, ought to be the best one for him to consult in so doing. The questions involved are traffic questions, to be sure, and it would be well if the general freight agent could impart some of the instruction which young agents need; but if the instruction belonging to several different departments is to come from a single instructor, the superintendent is the man to do it or get it done.

The division superintendent mentioned in the letter is a familiar figure on many roads, and we are not sure but he is growing more numerous year by year. Certainly the qualifications necessary are no less complex than in the past, and, generally speaking, no pains are taken to improve the means of getting men who possess them. Ex-parlor car conductors, whose uncles are directors, and genteel young men who have six months' office experience, and absolutely no other warrant (except influence) for holding a responsible position, seem to be more common than ever. Scenes like the one described are easily enough accounted for. That young man had been over the road in the officers' car, and the value of neatness, of course, was there readily appreciated. We must certainly give him the credit of beginning right. Easy lessons should come first, hard ones later. That he should make the mistake of pitching into the wrong man about the dirt was not surprising. As for praising the cleanliness of the station, this man will probably grow to be a general manager before he will think of that, and not be worse than many men older than he. We all forget to commend. Neatness can be taught to a child, but to talk about getting traffic, and do it in such a way as to be instructive to the agent, requires long experience, or at least long tutelage under an "old head."

"The man who selects the superintendent" is at fault, of course; but he classes his difficulties in this direction along with those met in maintaining rates. The highly unsatisfactory condition of affairs is recognized, but the remedy is held to be out of reach. It is said, We would gladly appoint perfectly qualified men, but we cannot find them. Trainmasters, dispatchers, etc., who have been made out of station agents and conductors, lack the literary ability, social polish and general familiarity with the business world which is necessary, and our nephews lack knowledge of the details of the work and of the points learned through hard work. This being the case, say the

presidents, we must take one-sided men, whichever way we turn; we therefore may as well pick from one class as the other. And the inexperienced young men probably will be quicker to learn than those of the other class, because their training has been educational.

But this does not remove the difficulty. The need of better trained superintendents still exists. It can be met only by the railroads themselves, at least for the present. No college or university has yet attempted to turn out railroad men. Their engineers, political economists, and other men with knowledge and training which are valuable on a railroad, need much more superadded to these qualities. When will a dozen or two-core roads imitate and enlarge upon the good beginning made by the Pennsylvania, and perhaps one or two other roads?

December Accidents.

Our record of train accidents in December, given in this number, includes 64 collisions, 61 derailments and 11 other accidents; a total of 136 accidents, in which 46 persons were killed and 136 injured.

These accidents are classified as follows:

COLLISIONS:	
Rear.....	25
Butting.....	32
Crossing and other.....	7
DERAILMENTS:	
Broken rail.....	1
Loose or spread rail.....	3
Broken bridge.....	2
Defective switch.....	6
Broken frog.....	2
Broken wheel.....	6
Broken axle.....	2
Fallen brake beam.....	2
Misplaced switch.....	7
Runaway train.....	2
Derailing switch.....	1
Cattle on track.....	1
Washout.....	1
Landslide.....	1
Accidental obstruction.....	2
Malicious obstruction.....	1
Purposely misplaced switch.....	1
Unexplained.....	17

OTHER ACCIDENTS:	
Cars burned while running.....	1
Boiler explosion.....	1
Cylinder explosion.....	1
Broken parallel rod.....	2
Miscellaneous.....	6

Total number of accidents..... 136

The causes of collisions where given were as follows:

	Rear.	Butting.	Crossing.	Total.
Trains breaking in two.....	4	..	..	4
Misplaced switch.....	..	3	..	3
Failure to give or observe signal.....	5	..	..	5
Mistake in giving or understanding orders.....	..	3	..	3
Miscellaneous.....	7	5	5	17
Unexplained.....	9	21	2	32
Total.....	25	32	7	64

All but one of the "miscellaneous" were caused by negligence.

A general classification shows:

	Col- lisions.	Derail- ments.	Other.	Total.	P. c.
Defects of road.....	14	..	..	14	10
Defects of equipment.....	5	10	9	24	18
Negligence in operating.....	27	10	..	37	27
Unforeseen obstructions.....	..	10	2	12	9
Unexplained.....	32	17	..	49	36
Total.....	64	61	11	136	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger.....	25	22	9	56	41
Freight and other.....	100	39	2	141	104
Total.....	125	61	11	197	100

The casualties may be divided as follows:

	Col- lisions.	Derailments.	Other.	Total.	P. c.
Killed.					
Employees.....	18	22	1	41	89
Passengers.....	3	..	..	3	11
Others.....	..	..	..	..	..
Total.....	21	24	1	46	100
Injured.					
Employees.....	41	32	..	73	54
Passengers.....	31	26	3	60	44
Others.....	1	..	2	3	2
Total.....	73	58	5	136	100

Thirty-three accidents caused the death of one or more persons, and 32 caused injury but not death, leaving 71 (52 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with December, 1887, shows:

	1888.	1887.
Rear collisions.....	25	51
Butting.....	32	36
Crossing and other collisions.....	7	5
Derailments.....	61	83
Other accidents.....	11	7
Total.....	136	182
Employees killed.....	41	57
Others.....	5	14
Employees injured.....	73	87
Others.....	63	124
Passenger trains involved.....	56	79

Average per day:		
Accidents.....	4.39	5.87
Killed.....	1.48	2.39
Injured.....	4.39	6.80

Average per accident:

Killed.....	0.338	0.390
Injured.....	1.000	1.159

The comparisons are not remarkable, unless it be in the number of rear collisions. We hope the marked diminution is not temporary. Derailment at a derailing switch because of the engineer's failure to stop at the home signal is an unusual item which appears in this month's reports. Doubtless this mishap occurs oftener than we hear of, as the consequences are not generally very serious. This is certainly a train

accident, though it cannot be attributed to a misplaced switch. Again we have to report a fatal collision caused by a conductor and engineer forgetting that they had a new time table. The five passengers killed this month were all in first-class trains and on roads which are rated by no means poor, the Northern Pacific, Louisville & Nashville and New York Central.

The newspaper reports of a number of accidents this month give enlightening details concerning the causes. Though unofficial, their circumstantiality gives them the stamp of truthfulness. The rear collision at Puyallup, W. T., on the 10th, happened early on a foggy morning. The engineer had served the company five years, but was not acquainted with the road at this point. He asked the brakeman if he knew the road, and was answered "fairly well." The engineer asked him to keep a lookout, but he "was lost in the fog," and, said the runner on his death-bed, "probably knew our whereabouts no better than I did." The engineer could have saved himself after reversing, but stayed on the engine to work the sand lever. Only one passenger was killed here, instead of 60 as at Mud Run, but the provision for a suitable lookout on the engine was even more faulty than at the latter place; the engineer apparently had to engage his pilot himself.

The similar case at West Milton, Pa., occurred in this wise.

"Just as the second train was approaching New Columbia the fireman went to the engine and told him to 'waken up,' finding him very drowsy. He approached him the second time and told him they were nearing West Milton, and that the water station was a short distance below. He then seemed to realize his position in a measure, but awoke in a dazed state and blew the whistle to stop. At this time he was running at 16 miles an hour, when, according to rule, he should have been running much more slowly."

The flagman of the preceding train was somewhat misled by the absence of a headlight on the engine. This runner, like the one mentioned above, sacrificed his own life. The accounts say he had worked 48 hours with but two hours' sleep.

The blame for the startling collision of passenger trains in front of the passenger station at Bardetown, Ky., on the 24th is laid to the operator at the previous station, who allowed an express train to follow an accommodation too closely. While this operator may or may not have been one of the oldest in the service, the occurrence is suggestive of the possibilities involved in the employment of young operators and trusting them with the enforcement of rules whose importance is known to them only by what they read on the time-table. Many a young operator has doubtless been in the railroad service several months, perhaps a year, without ever seeing two passenger trains moving in the same direction within 15 or even 30 minutes of each other. What realization has he of the importance of the rule to keep trains ten minutes apart? A special officers' train figured in a butting collision in Virginia in consequence, it is said, of the Superintendent and Road Foreman of Engines taking the control out of the hands of the conductor and engineer, who refused to move on a defective order!

At Tip Top, Col., on the 28th, the question was "whether train 44, bound east, was ahead of time, or whether the extra west was running on the former's time." * * * Both crews have a very likely story and expert railroad men have failed to make head or tail of it.

A rear collision apparently would have followed the derailment at Lyman, Mo., on the 18th, but for the heroic conduct of the fireman. In a butting collision at East Mauch Chunk, Pa., among the passengers severely shaken up was one (being transported on a stretcher) who was still suffering from hurts received at Mud Run. His opinion of railroads must be more severe than an Iowa legislator's.

At Cuchara, Col., two brakemen engaged together in setting the same brake were killed by the brake wheel giving way. On the Ulster & Delaware a mail agent fell backward from the open door of his car and went down a bank, but survived. The derailment of a freight train at the entrance of the Victoria bridge, Montreal, Dec. 7, is said to have been the first derailment on the bridge in its history of 29 years.

The statement published by the Atchison, Topeka & Santa Fe, while apparently straightforward as far as it goes, is not complete enough for detailed criticism. It gives no figures for traffic operations, but only financial ones. It does not arrange its results in such fashion that we can compare them readily with previous years. The status, present and future, of the contingent liabilities on the auxiliary lines, is left almost wholly in the dark. Above all, the time in which the increase of floating debt originated is not made at all clear; for we are not told the amount of net debt carried forward on Jan. 1, 1888. If the whole \$8,643,000 be correctly described as "originating during the period in question," it is not right, in estimating the net amount, to deduct the whole cash on hand at its close, but only the increase of such cash and accounts receivable.

The accounts of the Atchison system proper are presented in clear shape. They are as follows for the 11 months ending Nov. 3:

Gross earnings.....	\$14,297,400
Operating expenses.....	9,673,775
Net earnings.....	\$4,623,625
Add interest on securities in collateral trust.....	508,892
	\$5,132,517
Interest on bonds, direct.....	\$2,188,049
" as rentals.....	1,456,254
" on guarantee notes.....	3,500
Taxes.....	563,196
Sinking fund requirement.....	302,248
	4,513,247
Net profit.....	619,270
Other receipts.....	446,061
Gross profit.....	\$1,065,331
Deduct amount of dividends.....	2,625,000
Net deficiency.....	1,559,669

For the year 1887 the gross earnings were \$18,461,366; the operating expenses \$10,408,455. If we reduce these figures to the eleven months basis, we may say that the operating expenses are substantially unchanged in 1888, while the gross earnings have fallen nearly \$3,000,000. The question of the dividend-paying power of the Atchison, when looked at in this light, depends upon the chance of the restoration of railroad prosperity to the level of 1887 as distinct from that of 1888.

But there is another point which is left open. We are told that on the auxiliary lines there was a net deficit of about \$3,000,000, of which these lines themselves paid \$1,800,000 and the Atchison \$1,200,000. Is this \$1,200,000 included in the above account of operations in the main system, or is it simply charged to capital account as increase of floating debt, without appearing in the current operations? We hope that the former is true, but we should like more definite assurances. Then there is the further question, what would have happened if the auxiliary lines had been able to make less than \$1,800,000 good, which may have a most serious practical importance during the ensuing year?

Finally there is the worst question of all. What did the directors mean by increasing the dividend at the beginning of a period like this? It is impossible to believe that they had no idea of what was coming. Yet any other supposition places their conduct in a very bad light indeed. There may be some excuse for stretching a point in order to maintain the old dividend rate in times of depression; we know of none which can be advanced in favor of manipulation for the purpose of increasing the rate. We trust that an effort will be made to hold the directors to strict account for this action.

The Engineers' Club of Kansas City has addressed to the Legislature of the state of Missouri a memorial covering a draft of an act to promote the safety of bridges. The memorial recites the fact that there are a great many bridges of insufficient strength and bad design in use in the United States, and gives a number of examples of bridges that have fallen within the last two years, and expresses the belief that state control would, to some extent, secure the public against the danger of such structures. The proposed act provides that it shall not be lawful for any corporation or person to open for use any bridge of 20 ft. or more clear span until plans, strain-sheets, and "statements of strength" have been filed with the Secretary of State, together with a certificate by a bridge expert showing that the bridge has been proportioned to carry safely the loads for which it is designed, and that it has been designed and built according to correct standards and principles. All persons responsible for bridges of any sort in the state are required to file before the first day of January, 1890, a complete list of such bridges, giving location, character and length of spans, and to file also before the first day of January, 1892, plans, strain sheets and detail drawings, together with certificates from bridge experts showing that the bridges are proper for their proposed uses. The Governor is required to appoint a sufficient number of engineers, to be known as bridge experts, who shall exercise the exclusive right of certifying to the plans and specifications filed. These bridge experts are required to pay an initial fee of \$100 each and an annual fee of \$25 each, which goes into the bridge fund, the uses of which are specified. A scale of maximum fees which may be charged by these experts shall be approved by the Governor. Provision is also made under which the Governor may have bridges re-examined by experts other than those certifying to them, and the same provision is made for plans, strain sheets and statements. The fees for such special examinations are to be paid out of the bridge fund. If any bridge structure is reported unsafe, the Governor is required to cause it to be examined by an expert, but the informant must file with the Secretary of State a bond to defray all expenses and resulting damages in case his allegations do not prove to be well founded. In case any bridge structure is found to be unsafe, it shall be the duty of the Governor to notify the owner thereof, and in case it is not made safe within a reasonable time, he shall report the facts to the next general assembly. In case of serious bridge accidents investigations are to be made, by the direction of the Governor, by the bridge experts, and reports made to the general assembly. Penalties are imposed for failure to file plans, etc., or to remedy deficiencies which have been pointed out by the examination of experts. It is stipulated in the draft of the proposed act that nothing in these provisions shall modify or diminish the responsibility of the builders or owners of bridges that have been approved by the experts. We do not see, however, how this result can be avoided, in public opinion at least, if not in the courts. The effect of having to put on file plans, strain sheets, and other information where they will be accessible for inspection and criticism by proper parties would very likely offset any evils that would attend an effort at state regulation of bridges, and it will be well to have the experiment tried.

On Thursday morning of last week, during a dense fog, the Elevated roads in New York and Brooklyn had two slight rear collisions, that on the former being a double one, a third train running into the second. In Brooklyn the bump did no damage at all, throwing some standing passengers off their feet being the worst result; but one man on the platform became so excited that he jumped over the gate and into the street, receiving fatal injuries. Because of this, and because such a large number of readers are interested in any occurrence on these crowded roads, the city papers preface the news with their usual "scare" head lines, and attribute the death of the Brooklyn passenger directly and solely to

the road's negligence. A road certainly must use all possible means to avoid frightening its passengers as well as to avoid injuring them, but it can hardly provide against every sort of rashness. The somewhat similar case at Fishkill, N. Y., a few months ago was different, in that the woman who made the fatal leap—or mistep—was taking a fairly reasonable means of escaping the impending danger. The problem of the elevated railroads is somewhat difficult. On the Manhattan (104th street, New York) the trackmen proceeded to take up their positions as fog men immediately on the appearance of the fog, but they were 20 minutes in doing this, and during the 20 minutes the collision occurred, slightly injuring several passengers. To stop all trains for 20 minutes on the advent of each fog bank would probably not scare passengers, but it would make them awfully mad, and would doubtless swell the stream of complaints enormously. The road, then, as long as it feels sure that its regulations provide against injury to persons would seem to be justified in keeping traffic moving. The only alternative of the system of fog men is an automatic block signal. Hitherto this device has been regarded as inadaptible to the New York city roads because of the density of the traffic. Blocks of sufficient length for safety in times of fog would be too long for clear weather, when trains have to follow one another very closely. This, with the delays incident to electric signals, and other reasons, has prevented the adoption of anything of the kind. But Black's mechanical block signal, which has been used experimentally for a year, and which continues to work very satisfactorily, offers a hopeful solution of the problem, and is, we understand, soon to be placed on a five-mile section of the Manhattan. This signal, recently described in these columns, turns to red by mechanical action, imparted by the wheels after each train; and it stands at red until the train has proceeded a safe distance and has set another signal at danger, when the wheels again press a lever, and set the signal at "all clear." While this system has its limitations, the moderate speed of the elevated trains and the frequency with which they are run give it peculiar fitness for these roads, and the operation of the signal on an extensive scale will be watched with interest. Its cost must be very much less than that of electric signals, which, if provided for short blocks, would be very expensive.

It appears that the collectors who have been employed on the passenger trains of the Atchison, Topeka & Santa Fe for over a year past, relieving the conductors of all work and responsibility in connection with the collection of tickets and fares, have been taken off. Many rumors to this effect have been published and contradicted during the past few months, and it does not appear now that all trains are being run without collectors, but a general order discontinuing them has been issued. It appears that the ruling, if not the only, motive in placing these men on the trains was to stop the speculations of dishonest conductors, and one reporter naively remarks in his dispatch that the present action is in consequence of the company being satisfied that the conductors will now turn into the treasury a sufficient proportion of the money they receive to make the change profitable. It is stated that the conductors are placed under \$500 bonds each, and one account has it that their reinstatement as ticket takers is in consequence of a proposition made by them to the company on the occasion of the recent reduction of wages on the road. The collectors have been receiving \$90 a month, and it is said that the conductors are to receive a large increase of pay.

NEW PUBLICATIONS.

The Railway Clearing House: Its Place in Relation to the Working and Management of English Railways. By Edward McDermott, F. S. S. *The Railway News*, London. H. V. & H. W. Poor, New York.

This pamphlet is a reprint of a series of articles which have already appeared in *The Railway News*. It describes in compact form the history and workings of the English Railway Clearing House. It is of special interest at present in view of the efforts which are now being made to establish a similar organization in this country under somewhat more difficult conditions. The English Clearing House originated in 1842. In 1845 it included 16 railroad lines, with an aggregate length of 656 miles. From that time forward it gradually extended itself until it became co-extensive with the English railroad system. At the outset it was confronted by administrative difficulties due to the different methods of accounting, and with disputes about demurrage charges. Fortunately, it was managed by men of great sense and power, who were able to harmonize these differences between the several companies, and who secured the necessary power and responsibility by an incorporation under act of Parliament. We have no space to describe in detail the different methods employed. Suffice it to say that the English Clearing House differs from most of the American attempts in the same direction in having an independent force of its own to report car movement and to check errors in the returns made by the companies themselves. It is comparatively rare that questions of responsibility arise either for loss or delay. The whole matter has now been reduced to such a system that the "numbermen" can do a vast amount of work, involving nothing less than a complete record of all business interchange between the companies.

There are some points which are easy to settle in England which would make great trouble here. In the first place, the distances are so short that immediate reports could be made, and matters might thus be settled in a day which in the United States would necessarily wait a week or more. Further than this, the English clearing house was, in its early days, greatly assisted by the toleration which the law gave to pooling contracts, and which is conspicuously absent in

this country at present. It is the fashion to speak of the English clearing house as though it had stopped rate wars. It undoubtedly had an important indirect effect of this kind, but its direct influence was small. In fact, the officials of the clearing house have taken special pains to arrange their settlements in such a manner as not to be required to touch disputes between individual companies with regard to traffic questions. It has become a purely executive body, without powers of original decision or of arbitration. It has avoided interfering as arbitrator, even when it was asked by the railroad companies to do so.

The description of the operations of the clearing house seems accurate, but we note one most serious statistical error. On page 34 the author gives an estimated passenger mileage of 12,000,000,000 for the railroads of the United Kingdom. Now, the receipts from passengers in England during the last year were in round numbers, £26,000,000, or less than \$130,000,000. This would give an average passenger fare of little over one cent a mile; but no authority estimates the average English passenger receipt at less than two cents a mile, and some place it higher. Mr. McDermott has undoubtedly made a mistake of about one hundred per cent. in the number of passenger miles, and although this is in one sense not important in connection with the general subject, it is interesting as showing how little the railroad statistics even of English specialists can be relied upon. This neglect of statistical information shows itself in what the book omits to tell us. We have no systematic information about the amount of traffic cleared, further than the obviously inaccurate statement that "a large proportion" of the passengers carried travel over more than one railroad, and a detailed but rather useless list of the kinds of lost parcels returned to their owners. The whole pamphlet is a popular description, rather than a systematic account of operations; and the man who refers to it with the latter purpose in view, is likely to be disappointed.

Railway Young Men's Christian Association Signal, Kansas City, Mo. Of the numerous publications of this kind received at this office the above is one of the very best. Its editor understands the art of putting things in an attractive way. The January number contains a historical sketch of the rise and progress of associations of this kind for railroad men. They began in 1872, though libraries for employes have received more or less attention from railroad managers since 1850. It is stated that railroad managers now appropriate over \$60,000 a year for institutions of this kind. An extended list of testimonials to the value of the work from numerous railroad presidents, directors and managers is quoted.

Report of the Proceedings of the 22d Annual Convention of the Master Car Builders' Association, 1888.

This document, always interesting and valuable, appears this week. We notice no change in the arrangement. The various standards of the Association are shown on folding plates, which this year are printed on good tough paper which will bear handling. A plate showing the contour lines of the M. C. B. Coupler is added, and also a large sheet containing the tabulation of the results of experiments in continuous heating, which was printed in the *Railroad Gazette*, June 22, 1888.

Messrs. John Wiley & Sons have just issued a list of new books and new editions published in 1888, and of new books in preparation. The catalogues of this enterprising house contain the titles of many of the most valuable modern scientific books in the English language.

TECHNICAL.

Feeding Boilers.

Mr. Plumier, mining engineer, recently read a paper at the monthly meeting of the graduates from the Engineering School of Liege, on the best manner of feeding steam boilers. He is opposed to the ordinary method of feeding in the coldest part, the most remote from the furnace. The boiler sheet has always about the same temperature as that of the water in contact with it. The feed should not be introduced in such a manner that the hot and cold water rest in strata; for in this case the plates in contact with the feed water (which goes to the bottom by reason of its greater density) will have at times a much lower temperature than the rest of the boiler. Hence there will necessarily result a different amount of expansion between the upper and lower sheets, which will tend either to open the riveted joints, or to produce corrosion and rapid deterioration of the boiler. This is proved by numerous practical examples. Mr. Plumier concludes, therefore, that the feed water must be mixed at once with the heated water in the boiler, thus preventing the former from sinking in a mass to the bottom and remaining there for some time at a comparatively low temperature. The engineers of the Boiler Inspection Company advise that the end of the feed pipe should be curved so as to discharge into a small vessel placed in the steam space, from the edges of which vessel the water flows gently, in minute quantities. Other engineers feed in the steam space, discharging into a long pan, where a large portion of the impurities are retained, because water suddenly heated to a high temperature precipitates its saline matter.

Coal in Mexico

A dispatch from El Paso states that an important concession of coal lands within three miles of El Paso, but on the Mexican side of the river, has been made by the Mexican Government to Felipe Arellano, of Paso Del Norte, and a number of El Paso parties, among whom are P. A. Arkins, George Russell, A. R. Hillebrand, L. H. Davis, Rosina Heley and M. E. Flores. The concession is for 6,250 acres, and is just outside of the municipal limits of Paso del Norte. One vein of coal, about 3 ft. thick, has already been opened, and proves to be a good article of semi-anthracite. There are said to be several other veins, and active prospecting for them, by drilling, will be commenced as soon as the extent and full character of these coal deposits have been demonstrated.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Eastern Illinois, quarterly, $1\frac{1}{2}$ per cent., on preferred stock, payable March 1.
Chicago & Indiana Coal, quarterly, $1\frac{1}{2}$ per cent., on preferred stock, payable March 1.
Cincinnati, Sandusky & Cleveland, semi-annual, 2 per cent., payable Feb. 11.
Columbus, Springfield & Cincinnati, 2 per cent., payable Feb. 11.
Flint & Pere Marquette, $3\frac{1}{2}$ per cent., on preferred stock.
Mahoning Coal, 3 per cent., on common stock, payable Feb. 1.
West Virginia Central, \$1 per share, payable March 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.
Cumberland Railway & Coal Co., annual meeting, Montreal, Can., Feb. 13.
Delaware, Lackawanna & Western, annual meeting, 26 Exchange Place, New York, Feb. 19.
Huntingburg, Tell City & Cannellton, annual meeting, Cannellton, O., Feb. 14.
Kingston & Pembroke, annual meeting, Kingston, Ont., Feb. 13.
Illinois Central, annual meeting, 78 Michigan avenue, Chicago, Ill., March 13.
Keokuk & Western, annual meeting, Keokuk, Ia., Feb. 6.
Lincoln Park & Charlotte, special meeting, 36 Wall street, New York City, Feb. 13, to consider whether \$350,000 bonds shall be issued and whether the road shall be leased to the Buffalo, Rochester & Pittsburgh.
Missouri Pacific, annual meeting, St. Louis, Mo., March 12.
New York, Susquehanna & Western, annual meeting, Jersey City, N. J., Feb. 28.
St. Louis, Iron Mountain & Southern, annual meeting, St. Louis, Mo., March 12.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Institute of Mining Engineers* will hold its nineteenth annual meeting in New York city, Feb. 19. The hotel headquarters will be at the Union Square Hotel.
The *National Association of Railway Surgeons* holds its annual convention in St. Louis, Mo., May 2, 1889.
The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.
The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.
The *Central Railway Club* meets at the Tiff House, Buffalo, the fourth Wednesday of January, March, May, August and October.
The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.
The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.
The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.
The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

New York Stock Exchange.

The Governing Committee of the New York Stock Exchange has listed the following new railroad securities:
St. Paul & Duluth, \$400,000 second mortgage bonds, making \$2,000,000 listed.
Mexican National, \$500,000 first mortgage bonds, part of the \$12,500,000 authorized.
East Tennessee, Virginia & Georgia, \$2,500,000 equipment and improvement bonds, of the issue of \$6,000,000.
Norfolk & Western, \$182,000 general mortgage bonds and \$900,000 improvement and extension bonds.
Louisville & Nashville, an issue of 6,303 shares of capital stock to pay the recent scrip dividend.
Union Elevated Railroad of Brooklyn, \$2,305,000 first mortgage bonds, guaranteed by Brooklyn Elevated Railroad.
Eastern Railway Company of Minnesota, \$3,500,000 first division first mortgage bonds.
Cincinnati, Sandusky & Cleveland, \$1,195,000 consolidated first mortgage five per cent bonds.

Annual Convention of the Master Car-Builders' Association.

At the last annual meeting of the Association, Lake George, Saratoga Springs and Niagara Falls were selected as the three places from which a committee was instructed to select one for the place of holding the next convention. The committee found that it was impossible to make satisfactory arrangements for hotel accommodations at either Lake George or Niagara Falls; and as none of the hotels at Saratoga will open as early as the second Tuesday in June—the regular time for holding the convention—the Executive Committee authorized the postponement of the date of meeting to the fourth Tuesday of that month, which will be the 25th. The annual convention for 1889 will, therefore, be held at Saratoga Springs, beginning on that date at 10 a. m. All who attend the meeting will be entertained at Congress Hall, at a charge of \$3 per day. One hundred and fifty rooms—the numbers of which have been specified—on the first and second floors, will be reserved for the members of the association. Those who wish to engage rooms before the meeting, or to secure extra accommodations, should write to H. S. Clement, Manager Congress Hall, Saratoga Springs, N. Y.

Association of North-American Railroad Superintendents.

\$50 PRIZE.

Secretary C. A. Hammond issues the following circular:

At a meeting of the association held in St. Louis, Sept. 19, 1888, the Committee on Roadway was authorized to offer a prize of fifty dollars, open to any railroad man, "for the best essay, or short treatise, on track-work, the proper care of roadway, and the most approved methods of building the superstructure of a railroad (not including grading or bridge-work), accompanied by such reliable estimates of cost as can be drawn from actual experience. The paper should also discuss the subject of systematic track inspection and the plan of giving premiums, showing the practical workings of such a system, with its advantages and drawbacks, if any."

As a slight guide in the preparation of such a paper, the following synopsis of topics is suggested, though not necessarily to be adopted; such of them may be developed as each writer's time, experience, or inclination may allow:

- I. Methods of drainage for roadbed, slopes, cuts, and tunnels. Protection of slopes and banks from caving and gullying.
- II. Cattle-guards. Road-crossings. Fencing.
- III. Ballasting and tamping. Methods of prolonging life of ties. Keeping up track in winter and early spring.
- IV. Remarks on tracklaying, spiking, spacing rails, joint-fastenings, etc. Maintenance and alignment of track on tangents and on curves.
- V. Experience with frogs and switches, also "slip-switches" and yard-work.
- VI. Examples of erroneous theories and faulty practice.
- VII. Protection of road against water encroachment of river, sea, or lake. Dykes and revetments.
- VIII. General rules and regulations to govern work done by maintenance-of-way department.
- IX. Systematic inspection of road, daily, monthly, quarterly, and yearly. The premium system.
- X. Extraordinary repairs: Washouts, broken rails, earthwork slips, road settlement in soft ground, repairs of track broken up by derailments.
- XI. Examples from personal experience of noteworthy incidents or achievements in road-work, remarkable occurrences, accidents (not caused by trains). Illustrations of ingenuity in overcoming difficulties or in the use of temporary expedients in quickly repairing damage to road-bed or track.
- XII. Reliable estimates of cost, both of regular routine work (construction or maintenance), and of special jobs or work of peculiar difficulty.

Each paper should be signed with a motto or assumed name, with direction for re-mailing to the care of some railroad officer, giving correct address to which manuscripts will be returned, except the one securing the prize, such paper to be retained for publication, when the writer's true name will be requested. Papers should be forwarded to the Secretary's office, 350 Atlantic avenue, Boston, Mass., not later than April 10, 1889. Competitors who may find themselves unable to complete their papers before April 10th will please write to the Secretary, stating probable time of completion, as in such case the committee may consider it advisable to grant an extension of time. Such letter should be signed with the motto or assumed name, as above directed.

New England Water-Works Association.

An adjourned meeting of this association will be held at Young's Hotel, Boston, Mass., on Wednesday, Feb. 13.

Illinois Society of Engineers and Surveyors.

The fourth annual convention of this association was held at Bloomington, Jan. 23-25, 1889. The programme included a large number of papers, and topical discussions on 15 different subjects. These, with excursions, made up a very busy and interesting meeting.

Of the papers most interesting to our readers, the first was "Progress of the Cairo (Ill.) Bridge," by S. F. Balcom, Assistant Engineer Illinois Central. The progress of erection was illustrated by the engravings from pages 18 and 19 of the current volume of the *Railroad Gazette*. The paper stated that of the bridge proper the foundation work was completed in December last; that the masonry will be finished by March 1, 1889, and that the bridge will be opened for traffic some months before the end of 1889.

Mr. Balcom, in his second paper, "Causes of Railroad Accidents," after referring to the inability of laws to prevent accidents and calling attention to the physical and financial difference between trunk and branch lines, enumerated the different causes of accident under the heads: Defects of roadway, defects of equipment, and inefficiency of service. He remarked that sometimes trivial defects caused serious accidents, while serious defects were singularly exempt, and gave various instances in illustration. In discussing broken rails as a cause of accidents, Mr. Balcom said that during the past year on his division of 307 miles, 90 steel rails were broken in the main line, of which 80 broke within a foot of the end.

Mr. Hansel, Chief Engineer of the Wabash, exhibited an illustrated pocket-book explaining train signals, which presented the matter in a remarkably clear and neat manner. This system was shown in the *Railroad Gazette* Nov. 2, 1888.

Mr. E. L. Morse, in his paper on "Methods of Measuring and Computing Earthwork," dwelt upon the old story of straining at a gnat and swallowing a camel in the matter of relative accuracy and also in taking and omitting data. He discussed the relative accuracy and simplicity of the usual methods of computing earthwork, and described some original diagrams for this purpose.

Prof. Talbot called attention to the difference in computing earthwork between the absolute error and the per cent. of error, and explained why such computations are not questions of pure mathematics. In the discussion, the remarkable statement was made by a member that he had recently been directed by his superior engineer to compute the earthwork of a division which averaged 30,000 cubic yards per mile by a set of standard and well-known tables which give quantities by the prismoidal formula, and subsequently a new chief required him to recompute the entire work by end areas "because the tables would not stand in court."

In "A Plea for Brick Construction in Engineering," Professor Baker urged that brick be substituted for stone in many engineering masonry structures.

Mr. E. A. Hill, formerly Chief Engineer of the Indianapolis, Decatur & Springfield, read a "Supplementary Paper on Nichol's Hollow Culvert." The original paper will be found on pages 329-31 of our last volume, and the above paper contained nothing materially different from the supplemental discussion by Mr. Hill found on page 718 of the same volume.

At this meeting a new feature was introduced—that of topical discussions—which proved to be both an interesting and profitable innovation. Prof. Baker opened the discussion of Topic No. 3, "Is it necessary to use double strength culvert pipe for culverts, or will ordinary sewer pipe be

strong enough?" by advocating that ordinary sewer pipe is strong enough for any height of embankment, provided there is sufficient earth over the pipe, say 3 ft. for railroads and 1 or 2 for highways. Mr. Balcom instanced two cases in which large culvert pipes having 1 and 2 ft. of earth over them respectively had failed under a railroad track. Mr. Hill stated that his road, the Indianapolis, Decatur & Springfield, had a large quantity of sewer pipe under their track and he knew of no failures, but he knew of no case where there was less than 3 or 4 ft. of earth over the pipe.

The discussion of No. 6, "What is the proper thickness of cover-stones for box culverts for different spans and heights of embankments?" was opened by Prof. I. O. Baker, who stated that the relation between the weight of the earth and live load was given, for average limestone or good sandstone, by the formula $T = \frac{1}{4} \sqrt{S + 5}$, in which T = the safe thickness of the cover in inches, and S = the clear span in feet; and then explained why the relation between the thickness of the cover and the pressure on it could not be calculated. A cover stone may fail because there is not enough earth over it, but probably never because the bank is too high. He stated that experience showed that for roads along the fortieth parallel of latitude the following relations were about right: For 2-ft span, 10 in.; 3-ft span, 12 in., and 4-ft span, 15 in.; and that in Canada, Northern Michigan, etc., 2 in. is usually added to each of these quantities on account of the greater effect of the frost.

The discussion of Topic No. 10—"The advantages and the disadvantages of the premium system for excellence in track works"—was opened by Chas. Hansel, Chief Engineer of the Wabash, who explained the details of the method employed on his road. He thought the results were very beneficial. Mr. Hill explained the method used on the Indianapolis, Decatur & Springfield, which differs from other systems in the constitution of the examining board; on most roads, the examining committee is composed of the higher officers, while on the above road the track foremen themselves constitute the examining board, each man marking on all the sections except his own. The advantage claimed for this system was the educating influence upon the foremen themselves. The premium is a month's pay to the entire section force, and also a certificate to the foreman. Incidental to the discussion of this topic, some interesting data on the cost of tracklaying was presented; but as it is a rule of this society not to allow the reporters the use of the manuscript in preparing notices for the press, our representative could not obtain reliable data by simply hearing the tables read.

The meeting was very successful in both interest and attendance. The society is in a very flourishing condition, a result confessedly due mainly to the efficiency of the Executive Secretary, Professor Talbot. The officers for the next year are: President, C. G. Elliott, Gilman; Vice-President, D. W. Mead, Rockford; Executive Secretary and Treasurer, A. N. Talbot, Champaign; Recording Secretary, S. A. Bullard, Springfield. The next meeting is to be held in Peoria the last week in January, 1890.

New York Railroad Club.

At the regular monthly meeting, held Jan. 17, the discussion on cast-iron wheels and standard axles for 60,000-lb. cars was continued.

Mr. W. T. Hildrup, General Manager of the Harrisburg Car Manufacturing Co., opened the discussion with a paper of considerable length. He spoke very highly of the paper read by Mr. Barr at the last meeting, but at the same time differed from him in his ideas of the effect of the contracting chill. Mr. Hildrup gave an historic sketch of the development of the cast-iron wheel. Mr. Hildrup having made the first pattern of the Washburn wheel with a single plate next the rim and a curved bracket. He spoke of the early devices for cooling the cast wheel in such a way as to prevent internal stress, which were finally merged in the present universal practice of cooling in annealing pits. He then spoke of the trouble arising from unequal expansion under the heat caused by prolonged application of brakes on long grades, and of the difficulty of providing for this. He pointed out the other difficulties in designing a wheel for a heavy and fast traffic, and stated that, while car builders have provided for increased severity of service in all other particulars, they have not been willing to properly increase the weight of wheels. In Mr. Hildrup's opinion a wheel for a 60,000 lb. car should be not less than 600 lbs. in weight. The increase of cost is simply that of iron and molding, for nothing is added for melting, cleaning, trimming or fitting, and a large proportion of this increased cost goes back as old metal in the end.

Mr. Lobdell followed Mr. Hildrup in a paper, in which he endorsed the suggestion of a 600 lb. wheel for 60,000-lb. cars. Such a wheel will admit of a harder and more durable chill, and yet possess the requisite strength and elasticity. In his opinion the best form of wheel to counteract the tendency to crack from heating by the brakes is the old double plate wheel made by Bush & Lobdell. He holds that in this wheel a more uniform chill can be made, there being no currents passing out of the spaces of the mold which form the brackets and striking against the chill. It is a cleaner wheel, having no brackets on the outside to face up and test; it is less liable to crack and sweat; it chills deeper at the throat; it is less liable to cooling stresses, and the curved plates yield sufficiently to meet the increase in diameter of the tread as heated by the brake. Mr. Lobdell also advocates the use of thicker flanges than are now usual. Wheels recently made by the Lobdell Co. for the Philadelphia, Wilmington & Baltimore have a flange about $\frac{1}{4}$ in. thicker than the M. C. B. standard. He also advocated inspection and physical tests, adding that if railroad companies would pay a fair price for a good wheel, and buy only from wheelmakers of experience and reputation, they would save money.

Mr. Chapin agreed that there should be tests of wheels, but thought that there should also be a guarantee of service. He does not think that there is any test that the railroad companies can get up that wheel makers cannot get around in some way.

Mr. Hildrup agreed with Mr. Lobdell, that the double-plate wheel is the best, but thought it a question of price. The double-plate wheel will cost 50 cents more to make than the single plate, and that 50 cents won't be enough to turn the contract.

Mr. Hildrup read a second paper, going to controvert the idea that a better wheel can be made with the contracting chill than without it. He asserted plainly that he did not believe that a sectional chill does contract, or that the amount of expansion in an ordinary chill is injurious. Heating chills by steam or otherwise was attempted long ago. As early as 1842 Bush & Lobdell cast wheels in heated chills, and in 1862 a patent was granted for chills or molds for railroad wheels, which were heated by means of steam or hot air introduced into an angular space. Mr. Lobdell did not think that the increased mileage of wheels on the Chicago, Milwaukee & St. Paul, as shown by Mr. Barr, was greatly due to the improvement in the character of the wheel due to the use of the contracting chill.

Mr. Chapin took up the discussion in favor of the contracting chill. He said that at his works they are able, with the contracting chill, to make a round wheel with an even chill,

which they were never able to do before. He gave figures from his December pay-roll showing that out of 698 wheels made in the contracting chill 26 were lost; out of 427 made in the ordinary chill 31 were lost, and of these 21 were chill cracked. They can pour the iron hotter and get no chill cracks whatever.

Mr. W. T. Hildrup, Jr., Superintendent of the wheel department of the Harrisburg Car Manufacturing Co., read a paper of some length. He thought that Mr. Barr, in accounting for the reduced number of wheels chill-cracked, had not given sufficient weight to the constituents of the mixture of which they were made, different metals varying greatly in liability to such failures. He thought that the sectional chill was liable to breakage and that the cost of replacing it would more than offset in the wheel foundry the saving of chill-cracked wheels. He had found no difficulty in making wheels accurately round. As to the proper weight of wheel for a 60,000-lb. car, Mr. Hildrup thought that a wheel of from 550 to 560 lbs., or even a lighter wheel, could be made successfully to meet the requirements of a 60,000-lb. car, but to be perfectly safe these wheels should not have a chill of more than $\frac{1}{4}$ in. at the throat and $\frac{1}{2}$ in. on the tread. Such wheels would not be durable, but by adding 50 lbs. weight to the wheel, the heavier chill can be used and a more durable wheel secured. Moreover, the heavier wheel would undoubtedly be safer. He thinks that it is false economy to save iron in car wheels when unusually heavy service is required, and advocated the use of a 600-lb. wheel for a 60,000-lb. car. Mr. Hildrup believes that the average wheel maker can make wheels of this weight, which would be cheaper in first cost, safer in service and cost less per thousand miles run, than any kind of steel or composite wheel that has yet been put on the market.

The Accountants' Association.

The American Railway Accounting Officers' Association met in St. Louis Jan. 24. President M. M. Kirkman (Chicago & Northwestern), presided, and C. G. Phillips, of the same road, was Secretary. Over 100 members were present, and many subjects were discussed. No definite action was taken, however, and all the questions before the meeting were referred to committees, to be reported upon at the annual meeting of the association at Niagara Falls, in July.

The Central Railway Club.

At a meeting of this club in Buffalo, Jan. 23, delegations were present from the New England Railroad Club and the Western Railway Club. In the absence of the president and vice-president, Mr. John W. Cloud presided. The officers elected for the ensuing year are: President, E. Chamberlin, M. C. B., New York Central & Hudson River Railroad; Vice-President, A. C. Robson, M. C. B., Lake Shore & Michigan Southern; Secretary and Treasurer, F. B. Griffith, M. M., Delaware, Lackawanna & Western. Executive Committee: T. A. Bissell, Manager Wagner Works, Buffalo; E. Chamberlin, James Macbeth, M. M., West Shore; Peter Smith, New York Central & Hudson River; F. D. Adams, M. C. B., Boston & Albany; James R. Patrie and Richard Donavy, Foremen Car Repairs, New York Central & Hudson River Railroad. The constitution of the club has been so amended as to allow railroad supply men to become members.

The discussion of the subject of interchange of cars was opened by Mr. Chamberlin, who read from the minutes of the last meeting:

"That it is the sense of the meeting that an oil box be accepted under a car, if it suits the same brass and key as the original, without reference to the contour of the box or the style of lid; but in all cases the oil box hole, centres, depth of box and diameter of holes be the same as the original; also, that the arch brass be properly fitted to the box," and asked for the views of Mr. Adams on the subject.

Mr. Adams had stopped cars and put his own box under them because he did not wish to detain them. If all the parts of the cars were alike it would prevent much delay of freight.

Mr. Cloud thought that all roads were bound to conform to the standards of the M. C. B. Association. He did not believe in equipping cars with anything but standards.

Mr. F. B. Griffith thought that initials should not be put on box lids; but Mr. Adams thought that they should be, if honestly done. He had seen, however, materials with the initials of the Boston & Albany which had not been made by that company. Mr. Adams refuses cars with bad ladders or handles. He had recently had two cases of handles pulled off from foreign cars and men hurt. He ordered ladder rounds put on when they were missing.

Mr. Chamberlin brought up the question, what old defect should stop a car? A former resolution provided that a vertical crack of $\frac{1}{2}$ in. on the draft sills would not stop cars.

Mr. Robson thought that if a sill was cracked $\frac{1}{2}$ in. over the transom, it should come out. All cars should have broken draft timbers taken out.

Mr. Robert Potts thought that a car was safe with cracked draw-bar sills if 4 good truss-rod rods were under it.

Mr. Adams thought that when a car had a crack across the transom, in either one or two draw-sills, inspectors should card it as broken when taken, and repairs should be paid for.

An excursion was made to East Buffalo to see the Gould vertical plane coupler, which was shown as applied to several hundred new cars. The New York Car Wheel Works were also visited, where were seen the chilled car wheels, ground and finished, by the process of Mr. P. H. Griffith. The wheel is ground on tread and flange by a tool which will grind 40 wheels a day. A banquet was served at the Tift House, where various toasts were responded to by Messrs F. D. Adams, J. W. Cloud, J. D. McIlwain, E. Chamberlin, T. A. Bissell, Robert Potts, James Macbeth, W. C. Taylor and E. N. Lewis.

PERSONAL.

—Mr. Charles H. Hurd, for many years Superintendent of the Michigan Central, died at Concord, Mass., Jan. 26, at the age of 70.

—Captain Bertram Hanson, for many years the Passenger and Land Agent of the Union Pacific at San Diego, Cal., died there Jan. 24, of consumption.

—Mr. P. O. Littlejohn, who had the contract for building the mountain division of the Baltimore & Ohio, died at Allegan, Mich., Jan. 15, at the age of 75.

—Mr. F. H. Tows, formerly Secretary and Treasurer of the Chicago, Rock Island & Pacific for a number of years, died last week of apoplexy at Washington.

—Mr. Samuel E. Haines, formerly Master Mechanic of the Pittsburgh & Lake Erie, who has been in failing health for the past two years, died at his home in Youngstown, O., on Jan. 22.

—Mr. Angus P. Macdonald, of Toronto, one of the best known railroad contractors in Canada, died at his home Jan. 23, aged 76. He was a heavy contractor on the Intercolonial road.

—Mr. J. R. Adams, Superintendent of Bridges and Buildings of the Atlantic system of the Southern Pacific, died at San Antonio, Tex., on Jan. 11. He has been connected with the road for nearly 20 years.

—Mr. E. A. Graham, who was prominently connected with the Utica & Black River road from its construction, and with other large business interests, died at his home in Utica, N. Y., Jan. 27, at the age of 87.

—Mr. J. McConiff, Superintendent of the Southern Division of the Burlington & Missouri River road, died at Lincoln, Neb., Jan. 23, of hemorrhage, at the age of 48. For nearly 20 years he has been connected with various Western roads.

—Hon. William D. Washburn, who has been elected to the United States Senate from Minnesota, is President of the Minneapolis, St. Paul & Sault Ste. Marie road, and was long President of the Minneapolis & Pacific, which is now part of the former road.

—The authority of Mr. H. H. Tatem, Treasurer of the Cincinnati, New Orleans & Texas Pacific, has been extended over the four other lines in the system, to succeed Mr. F. Hahn resigned. Mr. Hahn has been Treasurer of these four roads continuously since 1877.

—Mr. Arthur Sinsell, Supervisor of Bridges, Buildings and Water Stations on the Fourth division of the Baltimore & Ohio, was struck by an engine at Wheeling, W. Va., Jan. 24, and received probably fatal injuries. He has been in the employ of the road for about 25 years.

—Mr. P. D. Fisher, Consulting Engineer of the Lake Erie & Western, died recently in Indianapolis of cancer of the stomach. Mr. Fisher was Chief Engineer of a number of Western roads, among which were the Kansas Pacific, the Columbus & Hocking Valley and the Toledo, Delphos & Cincinnati.

—Mr. Charles W. Johnson, Chief Engineer of the Chicago, St. Paul, Minneapolis & Omaha, was quite seriously injured in the recent fire in the company's building in St. Paul, by the breaking of the chain by which he was letting himself down from a window. One rib was broken and he was otherwise injured.

—Mr. Francis H. Tows, a director of the Chicago, Rock Island & Pacific, died in Washington, Jan. 23, of apoplexy. He was Assistant Secretary, Assistant Treasurer, Secretary and Treasurer successively from 1864 until 1885, and since then has been a director of the company. He was 75 years of age at the time of his death.

ELECTIONS AND APPOINTMENTS.

Addison & Pennsylvania.—At the recent annual meeting of the company the following were elected officers: Hon. T. C. Platt, of New York, President; William Brookfield, New York, Vice-President; George R. Sheldon, New York, Treasurer; Frank M. Baker, Addison, General Superintendent; directors, Henry P. DeGraff, Frank H. Platt, Augustus C. Gurme, Theodore F. Wood and James E. Jones, of New York; Frank M. Baker, Owego, N. Y.; James Horton, Westfield, Pa.; John Hammond, Osceola, Pa.; C. L. Pattison, Elkland, Pa.; and R. W. Clinton, Newark Valley, N. Y.

Adirondack.—The directors of the company have elected the following officers: William W. Durant, President; W. L. Strong, Vice-President; C. P. Huntington and F. H. Smith, Directors.

Baltimore & Ohio.—The headquarters of the Superintendent of the Chicago Division have been removed to the Passenger Depot at Chicago.

Big Horn & Southern.—The incorporators of this Montana company are: Eli D. Bannister, Paul McCormick, Wilbur F. Sanders, Thomas C. Power and Albert J. Seligman, of New York.

Canada & St. Louis.—At a recent meeting of the company E. C. Nichols, of Battle Creek, Mich., was elected President, the other officers remaining as they were, with J. J. Burns, General Manager; H. E. Asp, Vice-President; W. L. Story, Secretary, and J. A. Riordan, Treasurer.

Central Belt.—The officers of this company are as follows: President, J. A. Hudson; Secretary and Treasurer, Frank Blaine; General Manager, Theodore Gary; Chief Engineer, C. J. DuBois. The principal office of the company is at Macon, Mo.

Chicago & Atlantic.—The statement, recently published, that Mr. John Black had been appointed Master Mechanic of this road, with office at Huntington, Ind., is entirely without foundation.

Chicago, Burlington & Northern.—J. M. Barr, Superintendent, having resigned to enter the service of the Union Pacific in a similar capacity, J. R. Hastings, Assistant Superintendent at Minneapolis, succeeds him, with office at La Crosse, Wis.

Chicago & Eastern Illinois and Chicago & Indiana Coal.—The following circular has been issued by C. W. Hillard, Treasurer of the companies: "With sincere regret I have to announce the death of Mr. J. C. Calhoun, Local Treasurer. Mr. Calhoun has been connected with the Chicago & Eastern Illinois Railroad for nearly 12 years, and has always proved himself an able and faithful officer. The title of Local Treasurer is hereby abolished, and the general business of the office will be attended to by the Treasurer. * * * G. W. Baker is hereby appointed Assistant Cashier."

Cincinnati, Jackson & Mackinaw.—G. L. McKibben has been appointed General Roadmaster and Chief Engineer of the Ohio and Michigan divisions of the road, with headquarters at Van Wert, O.

Denison, Bonham & New Orleans.—W. T. Nevins has been appointed Receiver of the road on application of the First National Bank of Denison, Tex.

Denver, Texas & Gulf.—The following appointments and changes on the Panhandle system have been announced: The office of Superintendent of Motive Power and Machinery has been abolished. E. P. Henderson has been appointed Master Mechanic, in charge of the machinery and car departments of the Fort Worth & Denver City, with headquarters at Fort Worth, and will report to the Superintendent of the Southern division. F. W. Morse has been appointed Master Mechanic in charge of the machinery and car departments of the Denver, Texas & Fort Worth, with headquarters at Trinidad, Col., and will report to the Superintendent of the Northern division.

Deseret.—J. R. Middlemiss, J. E. Dooly, William Van Dyke, E. J. Swaner and Heber Young, are incorporators of this Utah company.

Elizabeth, Lexington & Big Sandy.—J. P. Nelson has been appointed Chief Engineer in charge of Maintenance of

Way matters on this division of the Newport News & Mississippi Valley system, with headquarters at Lexington, Ky.

Fitchburg.—The following directors were elected at the annual meeting in Boston, Jan. 29: William H. Hollister, Elijah Phillips, George Heywood, Robert Codman, Rodney Wallace, Charles T. Crocker, Augustus Kountze, Daniel Robinson, Frederick L. Ames, William Seward Webb and Francis Smith. The Board is the same as last year, with the exception of William Hollister, who is elected in place of Franklin N. Poor.

Florence Northern.—The following are the officers of this company: W. B. Wood, President; J. H. Field, Vice-President; E. B. Comly, Secretary; W. P. Campbell, Treasurer, and A. G. Negley, Chief Engineer. The general office is at Florence, Ala.

Grand Trunk.—The whole of the locomotive and car departments of the company, in Canada and the eastern states of the United States, will hereafter be under the charge of Mr. Herbert Wallis. C. K. Domville undertakes the charge of the company's foundries at Hamilton, Ont., and W. McWood, under the direction of Mr. Wallis, takes general charge of the car department.

Granite.—At the annual meeting of the stockholders of the company, held last week, the following officers were elected: President, William B. Sewall; Vice-President, John W. Leighton; Directors, John F. Osgood, William B. Williams, George F. Greene, Frederick S. Davis, Henry B. Osgood; Clerk and Treasurer, Henry B. Osgood.

Jameson & Franklin.—The stockholders of the road met last week at Stoneboro, Pa., and elected the following board of directors: Rasselas Brown, President; John Newell, O. G. Getzen-Danner, S. P. McCalmont, John C. Cornwell, R. P. Cann and Leonard Watson.

Jersey City & Western.—The incorporators of this company are as follows: Reon Barnes, Middletown, N. J.; Joseph McFadden, Passaic; Sidney Ward, Brooklyn; Frank R. Baldwin, Jersey City; Abram L. Voorhis, Newark; Frank W. Conard, Perth Amboy.

Kingston.—The incorporators of this Illinois company are: John Walton, Edward B. Hale, David Smith, B. F. Rhodeman and Lewis Straight.

Maryland Central.—The following are the directors chosen at the recent annual meeting: William Gilmor, George S. Brown, Hugh B. Jones, John Henry Miller and M. H. Houseman, of Pittsburgh; Warren F. Walworth, of Cleveland; Frederick B. Hubbell, of Baltimore. The board of directors organized by electing William Gilmor President, and C. F. Kerchner Secretary and Treasurer. The number of directors has been changed from thirteen to seven.

Meridian & Tusculum.—The following officers have been elected: Capt. W. H. Hardy, President; C. W. Robinson; Vice-President; John D. McInnis, Secretary, and Jesse Bounds, Jr., Treasurer. The general office is at Meridian, Miss.

Minnesota State Railroad & Warehouse Commission.—The new commission has been appointed as follows: Judge J. P. Williams, for one year; Hon. J. L. Gibbs, for two years; Gen. George L. Becker, for three years. The last two named were members of the old commission.

Mississippi & Little Rock.—The first board of directors of this Arkansas company is as below: Thomas L. Nelson, William A. Brannin, P. C. Dooley, F. F. Thomas and J. E. England.

Missouri, Kansas & Texas.—W. W. Campbell has been appointed General Baggage Agent, with office at Sedalia, Mo., to succeed P. M. Reade, resigned.

Pittsburgh & Lake Erie.—At the annual meeting of the road at Pittsburgh last week the following officers were elected: Secretary and Treasurer, J. G. Robinson; General Superintendent, Elliott Holbrook; General Freight Agent, F. A. Dean; General Passenger Agent, A. E. Clark; Auditor, H. H. Kendrick.

Richmond & West Point Terminal.—George J. Gould has been elected a director of the company.

St. Catharines & Niagara Central.—At the annual meeting of shareholders of this company held Jan. 28 at the office in St. Catharines, Ont., Lucius S. Oille, M. D. Sylvester Neelon, Edward A. Smyth, Henry A. King, James Morris, William W. Greenwood, and John Carroll were elected directors. The directors elected L. S. Oille, M. D., President; S. Neelon, Vice-President, and Richard Wood Secretary and Treasurer. John Vanderburgh is Superintendent, and John Warburton General Freight Agent.

St. Louis, Arkansas & Texas.—The following changes on the road have been announced: The office of Superintendent of Transportation will be abolished, F. Hufsmith, the Superintendent of that department, having resigned. The offices of Masters of Transportation for the states of Arkansas, Missouri and Texas are abolished. T. W. Kennan is appointed Division Superintendent for Arkansas and Missouri, with headquarters at Pine Bluff. H. S. Milton is appointed Division Superintendent for Texas, with headquarters at Tyler. The office of Roadmaster in the various states traversed by the road is abolished.

Edwin Gould has been elected Secretary of the company, with office in New York, to succeed J. S. Wells, resigned.

St. Louis & Peoria.—The incorporators of this new Illinois company are: D. L. Wing, A. J. Moorshead, Springfield; L. H. Thomas, Thomasville; C. J. Keiser, Mount Olive, and A. G. Kleinbick, Litchfield.

Sandusky, Mansfield & Newark.—The following directors were elected at the recent annual meeting in Norwalk, O.: John Gardiner and E. G. Gardiner, of Norwalk; J. O. Moss, A. C. Moss, A. H. Moss and Clark Rude, of Sandusky; L. I. Tracy, of Mansfield; Charles F. Mayer and Robert Garrett, of Baltimore. John Gardiner, of Norwalk, was elected President, and J. O. Moss, of Sandusky, was chosen Secretary and Treasurer.

Savannah, Florida & Western.—Marion Knowles has been appointed Western Freight and Passenger Agent, with office in St. Louis.

Sinnemahoning Valley.—At the recent annual meeting of this company the following officers were elected for the current year: F. H. Goodyear, President, Buffalo, N. Y.; C. W. Goodyear, Vice-President and General Manager, Buffalo, N. Y.; N. N. Metcalf, Secretary, Austin, Pa.; E. O. Cheeny, Auditor and Treasurer, Buffalo; H. C. Underhill, General Freight and Passenger Agent, Buffalo; C. A. Caldwell, General Superintendent, Austin; and F. F. Whittekie, Chief Engineer, Austin.

Union Pacific.—General Manager T. L. Kimball has issued the following circular: Taking effect Feb. 1, G. M. Cumming is appointed Assistant General Manager in charge of all the company's lines west of Cheyenne, with head-

quarters at Salt Lake City, and will report direct to the General Manager. The Superintendents of the Idaho and Wyoming divisions will report to Mr. Cumming. Taking effect Feb. 1, 1889, the duties of C. S. Mellen, Assistant General Manager, will be confined to the territory east of Cheyenne, and he will report direct to the General Manager. The Superintendents of the Colorado, Kansas and Nebraska divisions will report to Mr. Mellen direct. The office of General Superintendent will be abolished on and after Feb. 1, 1889. The General Superintendent, E. Dickinson, will for the present be unattached, and will report direct to the Vice-President, and will perform such duties as may be hereafter assigned to him.

Union Palace Car Co.—The Pullman Palace Car Co., having secured control of this company, the following directors were chosen last week: Geo. M. Pullman, Thomas H. Wickes, G. M. Dodge, Howard Mansfield, John Jay White, J. P. Marquand, and C. L. Atterbury. The old directors of the company who remain are: John H. Inman, E. D. Adams, E. D. Lauterbach, Job H. Jackson and John G. Moore. Mr. Pullman was elected President; Thomas H. Wickes, Vice-President; E. R. Chapman, Treasurer; Charles G. Hedge, Secretary, and John C. Paul, General Manager.

Utah & Arizona.—The first board of directors of this Utah company is as below: Theodore Brubach, Jacob B. Blair, George Cullins and F. L. Williams, of Salt Lake City; John W. Smith, of South Norwalk, Conn., and H. S. Kerr, of Moroni. H. S. Kerr is Treasurer.

Washington & Great Falls.—The incorporators of this new Maryland company are: Martin F. Morris, Joseph K. W. Cameron, Michael W. Beveridge, Wm. S. Thorndin, Norval W. Barchel, of Washington; James G. Berret, John J. Chisholm and Arthur W. Machen.

Western & Atlantic.—John R. Courtney has been appointed Ticket Auditor with office at Atlanta, Ga., in place of William A. Anderson deceased.

Williamsport & Binghamton.—At the annual meeting of the company, held at Williamsport, Penn., last week, the following directors were elected: F. M. Ward, Newton, N. J.; Charles Kilgore, of New York; Thomas E. Proctor, of Boston; Joseph P. Noyes, John Ray Clark, James B. Weed, Binghamton, N. Y.; R. F. Forreman, E. B. Payne, Edgar Munson, J. E. Dayton, William Gibson, Elias Deemer, Williamsport, Penn.; Isaac C. Black, Towanda, Penn. The Executive officers chosen are: F. M. Ward, President; E. J. Sterling, Treasurer; Charles F. Camp, Williamsport, Secretary; Gen. A. P. Berthoud, of New York, General Manager; F. P. James, Williamsport, Chief Engineer.

OLD AND NEW ROADS.

New Companies Organized.—Big Horn & Southern.—Charlestown & Jeffersonville.—Deseret.—Kingston.—Jersey City & Western.—Meridian & Tusculum.—Mississippi & Little Rock.—Monongahela River.—St. Louis & Peoria.—Utah & Arizona.

Alabama Midland.—Grading on the road has been commenced in Alabama and is now in progress from the west side of the Chattahoochee River through Henry County. It is expected that the whole line from Bainbridge, Ga., to the northern terminus on the Northwest & Florida road, at or near Ada, Ala., will be completed much earlier than the 11 months allowed by the contract. Louis McLain, the contractor for grading the road, has removed his headquarters from Thomasville to Bainbridge, Ga.

Big Horn & Southern.—Articles incorporating the company have been filed in Montana. The road will pass through the counties of Yellowstone and Custer in Montana, and Sheridan and Johnson in Wyoming. The northern terminus will be Yellowstone County, Montana, on the Northern Pacific, and the road is to be extended south to a point on the line between Montana and Wyoming, near the head of Five Mile Creek, which is to be the terminus of the main line.

Brighton, Warkworth & Norwood.—The company is making arrangements for the purpose of at once taking active measures looking to the immediate building of the road pursuant to the terms of its charter. The road will start from Presque Isle harbor and run via Brighton, Ont., Warkworth and Hastings to Norwood, Ont. There it will connect with the Ontario & Quebec road, and run northerly to the main line of the Canadian Pacific at or near North Bay.

Burlington & Missouri River.—A contract is reported to have been awarded to John Fitzgerald, of Lincoln, for building a line from Dewitt, Neb., eastward to Nebraska City, giving the latter place a more direct connection with the lines to Denver and Cheyenne.

Canada & St. Louis.—The J. J. Burns Co., Limited, which has just completed this road between Goshen, Ind., and Battle Creek, Mich., 58 miles, and from Midland to West Bay City, Mich., 18 miles, has made an assignment. The liabilities amount to \$1,000,000, while the assets are chiefly stock of the roads, amounting on its face value to about \$1,500,000, but whose market value is unknown. The heaviest creditors are John Fitzgerald, of Lincoln, Neb., for \$425,000; E. C. Nichols, of Battle Creek, who is also President of the railroad company, for \$85,000; the Joliet Steel Co. for \$225,000, and floating debts amounting to over \$150,000. The first two are for money loaned. It is stated that the directors of the roads will continue the construction of the lines.

Cedar Falls & Minnesota.—The company has instituted suit against the Illinois Central road for \$200,000 for 15 months' rental of the road.

Central Belt.—The surveys for this road have been completed and nearly all the right of way secured, and contracts will be let in the spring for building the line from Macon to Bevier, Mo., about five miles. C. J. DuBois, of Macon, Mo., is the Chief Engineer.

Centralia & Chester.—The name of the Centralia & Ste. Genevieve has been changed to the above. The company has contracted for its rails and rolling stock, and part will be delivered this or next week. As soon as the rails arrive tracklaying will be commenced between Sparta and Centralia, Ill. F. M. Gillett, of 3 Wall street, New York, is the contractor, and H. W. Schmidt, of Sparta, Ill., is the Superintendent of the road.

Central of Georgia.—On the extension of the Buena Vista & Ellaville road from Buena Vista to Columbus, Ga., a distance of about 38 miles, tracklaying has been completed for a distance of 12 miles. The light rails on the old line from Buena Vista to Americus, Ga., 30 miles, are being taken up, and replaced with heavier rails.

Charlestown & Jeffersonville.—A company has been organized at Jeffersonville, Ind., to build a narrow gauge line from Charlestown, Ind., to Jeffersonville, Ind., a distance of 15 miles. The incorporators are Dr. Thomas A. Graham and John C. Zulaut, of Jeffersonville.

Chesapeake & Ohio.—The General Council of Mt. Sterling, Ky., last week voted unanimously to offer this company \$35,000, and a large plot of ground centrally located, if the new machine shops, soon to be built, were erected within their corporate limits. Lexington and several other places have made similar offers.

Chicago & Northwestern.—The officers of the road last week held a conference with representatives of the various towns through which the proposed new line between Janesville and Lake Geneva, Wis., would pass. At the end of the conference it was announced the company did not deem it to be to its interest to build the line at present.

Chicago, Rock Island & Pacific.—It is stated that L. Faulkner, locating engineer, has arrived at El Paso, after leaving Liberal, Kan., the southwest terminal of the road, on Dec. 30, and locating the line to Fort Sumpter, thence to White Oaks and El Paso, over the Kansas City, El Paso & Texas route. The total distance is 340 miles.

Cincinnati, Hamilton & Dayton.—The suit of the company against Kuhn, Loeb & Co., of New York, to recover 4,500 shares of Dayton & Michigan stock alleged to have been illegally pledged with defendants by Henry S. Ives during his control of the Cincinnati, Hamilton & Dayton road, has been compromised. The terms are private, but the plaintiff gets control of the stock.

Cleveland, St. Louis & Kansas City.—The force of men and teams working on the road at Lamotte place, opposite Alton, has been doubled, and Murray & Co., of St. Louis, the contractors, say that the roadbed from Lamotte to St. Charles, Mo., will be completed within two weeks.

Cornwall.—The statement published last week in these columns that the Cornwall & Lebanon road was to have surveys made for a proposed extension from Cornwall to Mount Hope and Lancaster, Pa., paralleling the Philadelphia & Reading road, should have been credited to this road. This company is also surveying a line from Lebanon to Harrisburg, Pa., also parallel to the Philadelphia & Reading.

Deseret.—Charter filed in Utah to build a road in Emery County from the Denver & Rio Grande Western road to the mines of the Utah Coal & Iron Co.

Duluth, Red Wing & Southern.—The contract of Keating Bros. & Co., of Pittsburgh, with the Duluth & Red Wing Construction Co., by which they were to build 90 miles of the road, is said to have been annulled, and it is understood that the graded line to Zumbrota, Minn., will be finished by the Construction Company.

Florence Northern.—It is expected to let contracts immediately for building the first 25 miles of this road from Florence, Ala., toward Linden, Tenn. The remaining 60 miles to Linden is expected to put under contract by March 1. The preliminary surveys have been made the entire distance, but only the first 25 miles from Florence has been located. The road will be standard gauge and well ballasted. It will pass through rich ore fields and fine timberlands.

Fort Worth & Northwestern.—The proposition made by the company to Fort Worth, Tex., to begin the construction at once of a road from Fort Worth to Albuquerque, N. M., 460 miles, and to complete 85 miles in one year, if a subsidy of \$40,000 was guaranteed, has been accepted, and the amount raised. The company also agrees to maintain its main office and machine shops in Fort Worth. The road is to run through Springtown, Jacksboro, Graham and Seymour. It will reach the plains through Yellow House Canon. W. H. H. Lawrence is president.

Jersey City & Western.—The company has been incorporated in New Jersey with a capital of \$200,000 to build a road from Jersey City to Newark, a distance of about seven miles.

Kansas City & Southern.—The company has completed arrangements for an entrance into the city of Clinton, Mo., and next week will begin laying track from the Missouri, Kansas & Texas crossing to within one block of the public square, where the depot will be located.

Kingston.—This company has been chartered in Illinois to build a road from a point near Mapleton, on the Toledo, Peoria & Western road, to Kingston in Peoria County. The capital stock is \$15,000.

Louisville Southern.—J. R. Serpell & Co., of Louisville, Ky., have taken the contract for grading and masonry for the first four miles from Lawrenceburg, on the branch from that city to Lexington, Ky., 25 miles. This contract includes all the heaviest rock work on the line.

Louisville Southern.—Morris, Young & Co., of Lexington, Ky., have signed the contract to build 13 miles of road between Lexington and Versailles, Ky., to be completed by July 1. They will start work Feb. 1 with a large force of men, and will push the road through as soon as possible.

Maryland Central.—The York to Peach Bottom narrow gauge road, extending from York, Pa., to Peach Bottom, has passed into the control of this road. It is intended to change both the roads to standard gauge. The Deer Creek & Susquehanna road, which is being built from Belair, Md., to the Susquehanna River, 16 miles, will, when completed, be operated as part of this road.

Meridian & Tuscaloosa.—The company has been organized in Mississippi to build a narrow gauge road from Meridian to the Tombigbee River at Tuscaloosa, Ala. The preliminary survey will be soon made.

Mexican Central.—President Wade, who went abroad to place the financial affairs of the company on a more satisfactory and permanent basis, has made satisfactory arrangements for doing so. The present first mortgage pays 4 per cent. and carries with it an agreement to pay 3 per cent. additional under certain circumstances. This arrangement has been regarded as indefinite and unsatisfactory, and it is now proposed to retire the mortgage by conversion. A new priority mortgage of \$8,000,000, bearing 5 per cent., is to be issued, the proceeds of which are to pay off the outstanding 10 per cent. coupon notes and the debenture bonds, provided the consent of 75 per cent. of the present first mortgage bondholders can be had. The existing 4 per cent. mortgage is to be converted into a first mortgage 4 per cent., and the holders are to receive 30 per cent. of their holdings in new first income bonds. The present income bonds are to be converted into new consolidated income bonds, the company holding the option of paying them off at 50. The plan will reduce the present fixed charges by about \$1,100,000.

Milwaukee & Northern.—The contract for building an extension of 36 miles south from Rockland, Mich., to a connection with the Duluth, South Shore & Atlantic has been let to McIntosh Bros., of Milwaukee, Wis. Work will probably be commenced in February and the line completed next fall.

Mississippi & Little Rock.—This company has filed articles of incorporation in Arkansas, with a capital stock placed at \$1,000,000. The line of the proposed route is from Duncan, a station, on the Arkansas Midland, in Monroe

County, through the counties of Monroe, Prairie, Lonoke and Pulaski, a distance of 60 miles, to Little Rock.

Mississippi River & Mexican Gulf.—The surveys on this Mississippi road have been completed for the first 20 miles, and are still in progress. The road is projected to run from Vicksburg or Natchez, Miss., to Mobile, Ala., or Meridian, Miss., and it will be about 250 miles long. The line will pass through Hamburg, Wesson and Columbia. John P. Richardson is President and Luther Sexton is Secretary and General Manager. The chief office is at Wesson, Miss.

Monongahela River.—This company has been organized by ex-Senator Camden, of West Virginia, to build a road to extend along the banks of the Monongahela River, from Fairmont to Clarksburg, W. Va., a distance of 35 miles. Traffic arrangements with the Baltimore & Ohio have been made. Bonds have been issued at the rate of \$20,000 a mile. They are at 5 per cent. for 30 years, but it is stated that they will not be offered to the public for subscription. The road is to be built to develop extensive coal-fields in West Virginia, said to be a continuation of the Pittsburgh gas and coking coal-fields.

Newfoundland.—Mention has already been made in these columns that the government of Newfoundland has invited proposals until March 18 next for the construction and operation of about 250 miles of railroad in that country. A line is already completed and operated between St. John's and Harbor Grace Junction, and a branch line has also been constructed and is operated between Harbor Grace Junction and Harbor Grace. The unconstructed portion forms the continuation of the main line from Harbor Grace Junction northward to Hall's Bay, and the branch line from some convenient point on the main line to Clarke's Beach. Tenders will be received until March 18 next, and are to be addressed to the Colonial Secretary, Newfoundland, care of Messrs. O'Connor & Hogg, Solicitors, Ottawa, Canada. The tenders may be for both the operation and construction of the road, or may be only for the operation or the construction. The road is to be completed in five years. Any further information may be obtained of Messrs. O'Connor & Hogg, Ottawa.

New Roads.—A survey is being made from Butte to Anaconda, Mont., about 27 miles, for a road to be built between those points by, or in the interest of, the Anaconda Copper Co.

W. A. Slingerland, Jr., of Albany, N. Y., is making a survey for a proposed road, to extend from South Bethlehem via Tarrytown and Staatsville to Utica, N. Y.

New York & Harlem.—The New York City Park Commissioners have ordered the tracks of the Port Morris branch of the Harlem road sunk eight feet below the grade of the streets.

New York & Ohio.—The company has filed in Ohio a mortgage in behalf of the Farmers' Loan & Trust Co., of New York, for \$1,000,000, or an amount not to exceed \$20,000 per mile for the road. The line will run from Streetsboro, Summit County, O., to Greenville, Pa., connecting with the Cleveland, Canton & Southern at the former place, and with the Pittsburgh, Shenango & Lake Erie and other roads.

Northern Pacific & Manitoba.—The Railway Committee of the Canadian Privy Council has granted the company permission to cross the Canadian Pacific at Morris, Manitoba. The original plans have been altered. The crossing must be made not nearer than 800 ft. from the end of the Canadian Pacific switch.

Norwich & Worcester.—The officers of the road say in regard to the proposed extension to Groton, Conn., that nothing has been decided upon in regard to it, and it has not even been officially considered.

Ohio Connecting.—This line is intended to connect the Pittsburgh, Cincinnati & St. Louis with the Pittsburgh, Fort Wayne & Chicago by means of a bridge over Brunot's Island and the Ohio River at Pittsburgh, Pa. The line leaves the former road at Nimick Station and connects with the latter at Wood's Run Station. The total length of the line is 2½ miles. The line is located, bids for construction have been solicited and the work will be let as soon as the proposals are all in, and have been tabulated and compared. The line is built in the interest of the Pennsylvania Railroad for the facility of traffic upon its western connections, and is especially designed with a view of avoiding the passage of traffic between the southwest system and northwest system (west of Pittsburgh) through the city of Pittsburgh.

The work includes 21,000 cu. yds. of earth and loose rock excavation; 30,000 cu. yds. of solid rock; 31,800 cu. yds. of wet and dry foundation, which includes 6,340 cu. yds. for caissons and grillage foundations. Besides this there will be 213,000 lin. ft. of timber in foundation platforms and piles, 15,350 cu. yds. of masonry, six pin-connected iron bridges, aggregating 18 spans and over 3,400 ft. One of these bridges will contain 11 spans of 171 ft. each. There will also be three iron plate girder viaduct bridges, aggregating 999 lin. ft. The estimated cost of the whole work is \$1,200,000. Thomas D. Messer is President and M. J. Becker is Chief Engineer of the company.

Ohio Valley.—The second survey of the extension between Hopkinsville, Ky., and Princeton has just been completed, and varies but little from the first survey. The engineers will in a few days begin the final location of the road and secure the right of way. A force of men will then be put to work grading. Work along the route in Caldwell has been temporarily discontinued.

Oregon & Washington Territory.—Efforts are being made to secure an extension of the road to Union, Ore. It is proposed to extend the road from Pendleton up the Umatilla River to the Taylor & Ruckie road, and thence to Summerville and Union. General Manager G. W. Hunt has agreed to extend the road to these points if a subsidy of \$180,000 is granted.

Pennsylvania.—The contract for building the Unity branch of the southwestern system in Pennsylvania has been let to V. E. Gwinner, of Pottstown. This branch will extend from Latrobe to Lippincott and Whitney, in the new coke region now being developed by the Hostetter Coke Company. This company is now putting up 300 new ovens. The road is to be completed by July 1.

Pennsylvania, Poughkeepsie & Boston.—The grading on this road between Deckertown, N. J., and Pine Island, N. Y., is nearly all completed, and tracklaying is now in progress. It is expected to have this part of the line completed by March 1. Andrews & Warner are the sub-contractors for grading 40 miles between Campbell Hall, N. Y., and Deckertown, and John R. Lee, of Paterson, N. J., has the sub-contract for tracklaying and ballasting. Track is already laid on this section from Portland, Pa., west 10 miles, and from Deckertown west four miles. The contract for the rest of the line from Deckertown, N. J., to Slatington, Pa., will be let immediately. Baird & Co. have the general contract for the whole line. On the Hudson Connecting road from Campbell Hall to the Poughkeepsie Bridge, 20 miles, track

is now being laid, and it is expected that the work will be completed in 30 days. On the Poughkeepsie & Connecticut from the east side of the Hudson River at the bridge to Silvernail Bridge, N. Y., 26½ miles, the grading will be finished by March 1. McFadden & Co., of Lancaster, Pa., have the sub-contract for this section. From Silvernail the company will reach Hartford over the Hartford & Connecticut Western, which is now part of this system; and from Simsbury, Conn., 15 miles west of Hartford, a line will be built north to Springfield, Mass., a distance of 18½ miles.

Port Jervis, Monticello & New York.—The extension from Huguenot to Summitville, N. Y., on the New York, Ontario & Western, a distance of 17 miles, will be opened Feb. 3. The road diverges from the main line at Huguenot, four miles north from Port Jervis and 20 miles southeast from Monticello, and runs up the Navesink and Mamakating Valleys on easy grades to Summitville. The roadbed is substantially built and laid with steel rails.

Richmond & West Point Terminal & Warehouse Co.—Counsel for New York and Philadelphia, representing unnamed parties, last week presented a petition to the Attorney-General of Virginia asking that it be filed in the Circuit Court. It is a plea for a writ of quo warranto against this company for the purpose of forfeiting its franchises. The petition alleges that by the acquisition of competing lines the company has violated the limitations of its charter, and that by the acquisition of stock in and control of the various lines the company has exceeded the powers conferred by the act of incorporation. The acquisition of preferred stock of the East Tennessee, Virginia & Georgia and Virginia Midland and the Central Railroad & Banking Company of Georgia, are alluded to in the paper, and it is asserted that these acquisitions were an abuse of the powers of franchise of the company. Counsel for the company, though not served with the allegations, appeared before the Attorney-General and asked time to prepare an answer, which was granted and Feb. 9 fixed as the day of hearing.

Roanoke & Southern.—The contract for the 29 miles of road between Winston and Salem, N. C., and Martinsville, Va., mentioned last week, was let to Breen, Feeley & Newby, of Martinsville, Va. This completes the entire length of this division, and there will be no more contracts let at present. C. W. Pearson, of Salem, N. C., is Chief Engineer of the road.

St. Croix & Penobscot.—A press dispatch states that five miles of track belonging to the road, which runs from Calais to Princeton, Me., has been seized by Canadian customs officials. The road crosses the boundary at Baring, and for five miles is in Canadian territory. Recently the line was refitted with new ties, rails, etc., the company having in view its sale to the Grand Southern road. The St. Croix & Penobscot Company neglected to pay duty on the material imported for refitting the Canadian portion of the road, valued at \$30,000.

St. Louis & Chicago.—Owing to a default of more than 60 days in the payment of the amount due the Ohio & Mississippi by the St. Louis & Chicago road for rental of tracks in Springfield, Ill., the former has notified the latter that it has terminated the contract and will take possession of the tracks for its exclusive use. This action will prevent the St. Louis & Chicago from entering the city.

St. Louis, Iron Mountain & Southern.—Judge Wheeler, of the United States Circuit Court, last week rendered a decision in the suit of Solon Humphreys and Edwin D. Morgan, as Trustees of the New York & Pacific Car Trust Association, against the St. Louis, Iron Mountain & Southern upon a question involving a lease. The Car Trust Association was authorized to execute leases with the Wabash, St. Louis & Pacific for equipment and rolling stock. According to the lease \$101,250 was to be paid quarterly for a term of five years beginning in 1879. Afterward an agreement for the lease of the equipment and roads of the Wabash, St. Louis & Pacific was made with the St. Louis, Iron Mountain & Southern. A question afterward arose as to whether the defendant took possession of the road. The Wabash, St. Louis & Pacific saw no obligation to the plaintiffs by their subsequent lien, and a question of its validity also arose. So the suit was instituted by plaintiffs to recover the first quarterly payment from the St. Louis, Iron Mountain & Southern.

Judge Wheeler decided in favor of the plaintiff. In his opinion he said: "The argument made in behalf of the defendant, that want of power to take a lease of the roads would involve want of power to operate them or provide means of operating them, although sound in law, does not appear to be well founded in the actual situation. The defendant accepted such an instrument in that behalf as was made and operated to give the defendant the roads. The defendant became bound by its contract with the plaintiffs to provide rolling stock and equipment without reference to the actual validity of the lease."

St. Louis & Peoria.—This company has filed a charter in Illinois to construct a road from East St. Louis to Peoria. The principal offices are to be at Springfield, and the capital stock of the company is \$3,000,000. The incorporators are interested in the St. Louis & Chicago.

Sandusky, Ashland & Coshocton.—Sufficient subscriptions have been secured in Sandusky, O., to purchase the right of way for the road from that city southeast to Milan, and it is thought that the company will soon commence work on this section of the road.

Sioux City & Northern.—It is stated that the company has succeeded in placing an issue of first mortgage 6 per cent. 30-year bonds. The proposed route of the road is from Sioux City, Ia., north to Fallsdale, Dak. The right of way was secured some time ago. The capital stock paid in and the subsidies voted the line amount to \$5,000 per mile. Wakefield, Hill & Wingeland, of Sioux City, are the engineers of the line.

Texas, Sabine Valley & Northwestern.—It is stated that work will soon begin on the extensions northwest to Harris, Tex., passing through Gilmer, connecting with the Gulf, Colorado & Santa Fe at Paris, and south as far as Sabine Bay, on the coast, near Galveston, connecting with the Houston & Shreveport road at a point not yet decided upon.

Utah & Arizona.—The company has been chartered to build and operate a road from Chester, the southern terminus of the San Pete Valley road, to Mantli, 17 miles distant, via Ephraim City. The cost of construction, rights of way, rolling stock, etc., is estimated at \$170,000. The road is to be an extension south of the San Pete Valley road.

Utica & Unadilla Valley.—Albert C. Couch, President, announces that the surveys for the road have been completed, and that the maps and specifications are now ready. The road is to run from Bridgewater to New Berlin, N. Y., about 16 miles. Most of the right of way has been secured, and it is expected to have the road built by next July.

Washington & Great Falls.—Chartered in Maryland to build a road from the Great Falls of the Potomac, in

Montgomery County, easterly and thence southeasterly to a point on the boundary line between Maryland and the District of Columbia, and thence to West Washington. The capital stock is \$350,000.

Waynesboro, Pascagoula & Gulf Coast.—The survey for this road has been finished from Waynesboro, south to Scranton, Miss., on the Gulf Coast, a distance of 107 miles. Scranton is to be the southern terminus of the road, and when the improvements being made there by the United States Government have been completed it will be a deep water harbor. With the exception of Pensacola, Fla., Scranton is said to possess the finest harbor on the Southern coast. The proposed northern terminus of the road has not yet been definitely determined upon, but the object of the road will be to give the north and northwest a line through the eastern part of Mississippi to this port. The road will be built so as to connect with the Mobile & Ohio, and with the proposed Natchez Southern and Mobile, Jackson & Kansas City roads. Dr. J. R. S. Pitts, of Waynesboro, Miss., is President.

West Selkirk.—This company is applying to the Canadian Parliament for an act of incorporation to construct a road from Selkirk, Man., via the old McKenzie route of the Canadian Pacific to the Duck Mountain district. This section of the country has not yet been entered by railroads.

West Virginia, Pineville & Tennessee.—Preliminary surveys for this road will soon be run from the Tennessee state line south of Pineville, Ky., via Pineville, to the Breaks of Sandy. H. V. Loving, of Pineville, is now President and W. W. Duffield is Chief Engineer.

Wilmington & Weldon.—Tracklaying on the extension of the Scotland Neck branch from Scotland Neck, N. C., southerly to a connection with the Albemarle & Raleigh, near Bethel, N. C., a distance of 24 miles, will be completed next week. The extension crosses the Albemarle & Raleigh between Bethel and Robersonville, and grading is in progress from this point to Greenville, in Pitt County, 14 miles distant. From Greenville a further extension is now being surveyed southerly to Kinston and from there to Jacksonville, in Onslow County, about 65 miles from Greenville.

On the extension from Wilmington, N. C., easterly through Jamesville on the Jamesville & Washington road, to Plymouth, a distance of about 22 miles, the grading on the first six miles from Wilmington has been completed, and the whole line is under contract.

Yankton, Norfolk & Southwestern.—It is stated that some "English syndicate" has subscribed \$1,000,000 for the building of this road, and has constituted one "J. T. M. Pierce, of Yankton," its agent. The report continues that this agent has contracted for rails, and will next spring commence the construction of the road, which is to extend from Yankton, Dak., south to Norfolk, Neb., about 60 miles. Much of the right of way has been secured.

Yazoo & Mississippi Valley.—There was paid into the Mississippi State Treasury last week \$6,972 for taxes by the road, a branch of the Illinois Central, to the state for 1888. The county tax of \$13,863, due Madison, Yazoo, Leflore, Holmes, Grenada and Carroll counties, was paid directly to the tax collectors of those counties. The railroad paid the tax under protest, under a distress warrant issued by Auditor Stone. It claims that it is exempt from the tax under its charter. The suit to determine its liability as to this tax, and also the back taxes due, is now pending an appeal in the United States Supreme Court.

TRAFFIC AND EARNINGS.

The Inter-state Commerce Commission.

The Commission has filed an opinion in the case of W. P. Road against the Chicago & Northwestern, holding that the complaint is not sustained. The complainant in this case alleged discrimination on the part of the defendant in giving unreasonable advantages to producers of coal mined in Illinois, within the limits of a certain group, working under prejudice against the complainant and other miners of Hocking Valley and Pittsburgh coal.

On Tuesday of this week the Commission heard the case of Stone & Carten against the Detroit, Grand Haven & Milwaukee. The complaint charges discrimination against Ionia, Mich., by delivering freight free to consignees' doors at Grand Rapids, while to Ionia the carrier charges the same rates as it does to Grand Rapids, and only delivers freight to consignees at its warehouse.

On Saturday last the Commission issued a report on the subject of passenger tariffs and rate wars, prepared by Chairman Cooley. It narrates the facts attending the war in passenger rates at St. Louis in October, and of that at Chicago in December. In the St. Louis case, east-bound limited fares were reduced by all the lines from about \$22 to from \$3.50 to \$10. It is found that the provisions of the law were not complied with, and that the reductions in the manner in which they were made were not only illegal, but were unwise and injurious to the carriers who took part in the warfare, as well as to the public.

The chairman says: "Judging from the facts before us, there would seem to be no avoiding the conclusion that the dictates of reasonable prudence by every one of the carriers that met the cut rates had been disregarded. * * * But this is not all; it was perfectly apparent from the first that the only effectual and permanent remedy was to come to a better understanding. Hostile and retaliatory action naturally led in the other direction. It is not for a moment to be conceded that any one of the carriers involved in this controversy acted under any such compulsion as their agents now bring forward in order to excuse themselves. The imperative necessity under which they claim to have acted was matter of pure assumption. Some of them voluntarily began to cut the rates and all the rest hastened to follow the example. Every one could have abstained from doing what he did, and have continued to observe the established rates if he had not chosen to do the contrary."

"Each one, on a calculation of interest and to the disregard of everything else, decided not to do so. But when he chose to take part in reducing the rates, as he had an unquestionable right to do, there was nothing in reason or in the nature of things to preclude the reductions being made in conformity with the law. All the parties, however, elected the more reckless course. Had the law been observed in the making and filing of joint rates, the process would necessarily have been more slow and deliberate, and the reductions, it may be assumed, would not have been likely to reach the very low figures they finally attained. * * * Not one of the agents who took part in this reckless warfare is now able to show that, even when considered from the point of view of selfish interest, the action he took was excusable. In any light in which it may be viewed, it deserves to be designated unwise, and as coming under the condemnation not only of the law, but of selfish policy also."

Concerning the action of the roads in the Chicago war, the opinion says: "It might be reasonably inferred that the railway managers, knowing the disreputable nature of the business

[scalping] and the injury to their roads therefrom, would endeavor to bring it to an end, or at least to put restraints upon it. It was found, however, that in the country west and northwest of Chicago the fact was quite otherwise. In some respects the railroad business seemed to be managed with special reference to advancing the interest of these persons as if they were objects of consideration who must be made to prosper whether the roads did or not."

Concerning excursion tickets Judge Cooley says: "The Commission cannot believe that the railroad companies are consulting their true interest in perpetrating this condition of things. Many of the tickets are not believed to be excursion tickets in any proper sense. But if they were the duty to provide against abuses would seem to be clear. The abuses are facilitated by the great difference in price between these and ordinary tickets, and the question again arises as in the case of mileage tickets whether this difference cannot prudently be reduced. A scheme for redemption of unused tickets ought certainly to be possible, and if possible ought to be devised and put in force without delay."

The report concludes as follows: "In view of the facts above stated, and of facts somewhat similar coming to the attention of the Commission from other parts of the country, the Commission feels constrained to recommend that the act to regulate commerce be so amended as:

"First.—To define what shall be considered excursion and commutation tickets, and to restrict their issue in interstate commerce as to prevent the abuses now so common.

"Second.—To prohibit all payment of commissions on the sale of tickets for the transportation of persons by railroad in interstate commerce, and all sale of such tickets except by the regular agents of the carriers.

"Third.—To require the carriers to provide for the speedy and convenient redemption of the whole or any parts or coupons of any ticket or tickets which they may have sold, as the purchaser for any reason has not used and does not desire to use, at a rate which shall be equal to the difference between the price paid for the whole ticket and the cost of a ticket between the points for which the proportion of said ticket was actually used.

"The Commission also deems it proper in this connection to repeat what it has said in its second annual report, that the provision in the act to regulate commerce against the sudden raising of rates without notice ought to be clearly made applicable to rates jointly made by two or more carriers, and that notice of intention to reduce any rate which any carrier subject to the act makes or joins in making ought to be required to be given a specified number of days before the reduction should have effect.

Traffic Notes.

The Union Pacific has withdrawn its circular announcing a change in rates on corn to St. Louis.

The Post Office Committee of the National House of Representatives decided to report favorably a bill providing that, if any railroad company shall refuse or neglect to convey any mails upon any train upon which the Postmaster General may require such service, or shall wilfully refuse to obey any law respecting the transportation of the mails, it shall be liable to a penalty not exceeding \$1,000 for each day in which such refusal or neglect shall be persisted in.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Jan. 26, amounted to 56,509 tons, against 61,840 tons during the preceding week, a decrease of 5,331 tons, and against 45,947 tons during the corresponding week of 1888, a decrease of 11,462 tons. The following are the proportions carried by each road:

	W'k to Jan. 19.		W'k to Jan. 26.	
	Tons.	P. c.	Tons.	P. c.
Wabash.....	6,035	8.9	5,495	9.7
Michigan Central.....	6,837	11.9	4,320	7.6
Lake Shore & Mich. So.....	5,911	9.6	5,692	10.0
Pittsburgh, Ft. W. & Chicago.....	9,134	14.8	6,920	12.2
Chicago, St. L. & Pittsburgh.....	5,332	9.6	6,516	11.5
Baltimore & Ohio.....	4,413	7.1	4,791	8.4
Chicago & Grand Trunk.....	12,307	20.0	10,884	19.4
N. Y., Chicago & St. Louis.....	5,449	8.8	6,692	11.7
Chicago & Atlantic.....	5,732	9.3	5,289	9.5
Total.....	61,840	100.0	56,509	100.0

Of the above shipments 5,237 tons were flour, 23,469 tons grain, 2,113 tons millstuffs, 4,537 tons cured meats, 3,771 tons lard, 7,569 tons dressed beef, 670 tons flaxseed, 833 tons lard, 1,649 tons hides, 143 tons wool, and 3,254 tons lumber. The three Vanderbilt lines together carried 29.3 per cent. of all the shipments, while the two Pennsylvania lines carried 23.8 per cent.

Coal.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending Jan. 19, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Jan. 19.....	224,886	90,261	315,147
Total for year 1889 to date.....	603,179	272,762	875,941
Total for year 1888 to date.....	677,762	276,391	954,153

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1889.	1888.	Dec.
For the week ending Jan. 19.....	30,885	40,322	9,437
For the year to that date.....	75,910	90,971	24,061

The Cumberland coal trade for the week ending Jan. 26 amounted 61,584 tons, and for the year to that date 223,634 tons.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

NEW YORK, LAKE ERIE & WESTERN.				
Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Gross earnings.....	\$2,141,803	\$2,232,649	D.	\$90,846
Oper. expenses.....	1,457,121	1,548,418	D.	91,297
Net earnings.....	\$684,682	\$684,231	I.	\$451
Less proportion due leased lines.....	190,213	202,714	D.	3,501
Net earnings.....	\$494,469	\$481,517	I.	\$3,952
Three months, Oct. 1 to Dec. 31:				
Gross earnings.....	\$6,064,417	\$7,173,054	D.	\$208,637
Oper. expenses.....	4,457,644	4,652,687	D.	195,043
Net earnings.....	\$2,506,773	\$2,520,367	D.	\$13,594
Less due leased lines.....	608,825	650,656	D.	41,831
Net earnings.....	\$1,897,948	\$1,869,711	I.	\$28,237

PENNSYLVANIA.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Gross earnings.....	\$4,808,083	\$4,892,954	D.	\$84,871
Oper. expenses.....	3,612,241	3,511,054	I.	101,175
Net earnings.....	\$1,195,849	\$1,381,895	D.	\$186,046
Year to Dec. 31:				
Gross earnings.....	\$58,172,068	\$55,671,304	I.	\$2,500,764
Oper. expenses.....	39,351,144	37,086,576	I.	2,264,568
Net earnings.....	\$18,840,924	\$18,584,728	I.	\$256,196

PHILADELPHIA & READING RAILROAD CO.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Gross earnings.....	\$1,517,066	\$1,715,656	D.	\$198,590
Expenses (less rentals and interest).....	889,421	922,024	D.	32,603
Net earnings.....	\$627,645	\$793,632	D.	\$165,987

P. & R. COAL AND IRON CO.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Oper. expenses.....	\$1,125,563	\$1,573,422	D.	\$447,859
Expenses (less interest).....	1,377,483	1,619,628	D.	242,145
Net deficit.....	\$251,920	\$496,204	I.	\$244,284

TOTAL BOTH COMPANIES.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Gross earnings.....	\$2,642,629	\$3,289,078	D.	\$646,449
Expenses.....	2,236,904	2,541,680	D.	304,776
Net earnings.....	\$375,725	\$747,423	D.	\$371,703

There were 1,355,771 tons of freight carried in 1888, against 1,400,904 in 1887; there were 1,344,430 passengers carried, against 1,263,495 in 1887. The charge to operating expenses credited to sinking fund for December, 1888, is \$33,682.

NORFOLK & WESTERN.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Earnings from passen., mail and exp.....	890,835	\$75,238	I.	\$815,537
Freight.....	318,893	331,130	D.	12,237
Gross earnings.....	\$409,728	\$406,428	I.	\$3,300
Expenses and taxes.....	263,012	224,369	I.	\$38,643
Net earnings.....	\$146,716	\$182,059	D.	\$35,343

P. c. of ex. to gross earn. 64 55

Year to Dec. 31:				
	1888.	1887.	Inc. or Dec.	P. c.
Earnings from passen., mail and exp.....	\$1,002,551	\$812,091	I.	\$190,460
Freight.....	3,897,048	3,442,703	I.	454,345
Gross earnings.....	\$4,899,599	\$4,254,794	I.	\$644,805
Expenses and taxes.....	5,001,927	5,483,780	I.	518,147
Net earnings.....	\$1,897,672	\$1,771,014	I.	\$126,658

P. c. of exp. to gross earn. 61 58

ALLEGHENY VALLEY.

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Gross earnings.....	\$183,544	\$179,048	I.	\$4,496
Oper. expenses.....	107,378	105,321	I.	2,057
Net earnings.....	\$76,166	\$73,727	I.	\$2,439
Twelve months to Dec. 31:				
Gross earnings.....	\$2,068,965	\$2,029,108	I.	\$39,857
Oper. expenses.....	1,198,057	1,231,339	D.	33,282
Net earnings.....	\$800,927	\$797,769	I.	\$3,158

Month of December:				
	1888.	1887.	Inc. or Dec.	P. c.
Balt. & Potomac.....	\$113,224	\$220,983	D.	\$107,759
Del., Bay C. & Alp.....	14,243	37,113	D.	22,870
Del., Bay C. & Alp.....	33,000	33,629	D.	629
Del., Bay C. & Alp.....	11,672	12,297	D.	625
Mexican Central.....	438,887	540,656	D.	101,769
Guadalajara Div.....	217,176	286,772	D.	69,596
San Luis Potosi D.....	3,330	.....	.....	.....
Net.....	2,054	.....	.....	.....
Pennsylvania.....	4,808,083	4,892,954	D.	\$84,871
Net.....	1,195,849	1,381,895	D.	\$186,046
Petersburg.....	34,283	33,356	I.	927
Rich. & Petersburg.....	12,823	19,577	D.	6,754
Net.....	22,901	10,000	I.	12,901
Staten Isl. Rap. Tr.....	55,529	50,667	I.	4,862
Net.....	13,226	11,925	I.	1,301
Summit Branch.....	114,074	122,957	D.	8,883
Net.....	13,118	12,105	I.	1,013
Lykens Valley.....	82,731	92,208	D.	9,477
Net.....	747	def. 1,348	I.	2,095
W. Va. Cent. & Pitts.....	60,495	44,629	I.	15,866
Net.....	21,004	15,513	I.	5,491

Month of November:				
	1888.	1887.	Inc. or Dec.	P. c.
Central Pacific.....	1,381,562	1,300,303	I.	81,259
Net.....	514,530	602,340	D.	87,810
Lake Erie & Western.....	185,412	172,646	I.	12,766
Net.....	76,149	60,617	I.	15,532
Imp. Co.....	419,181	393,252	I.	25,929
Net.....	90,242	100,377	D.	10,135
Wabash.....	561,042	590,850	D.	29,808
Net.....	77,277	117,909	D.	40,632

Twelve months—Jan. 1 to Dec. 31:

Month of November:				
	1888.	1887.	Inc. or Dec.	P. c.
Balt. & Potomac.....	1,539,124	1,447,333	I.	91,791
Del., Bay C. & Alp.....	308,580	489,295	D.	180,715
Net.....	168,324	205,429	D.	37,105
Mexican Central.....	5,514,593	4,896,580	I.	618,013
Net.....	2,169,396	2,169,127	I.	269
Pennsylvania.....	58,172,067	55,671,313	I.	2,500,754
Net.....	18,840,924	18,584,728	I.	\$256,196
Petersburg.....	413,508	390,631	I.	22,877
Net.....	131,855	132,735	D.	880
Rich. & Petersburg.....	206,516	231,300	D.	24,784
Net.....	85,014	13,900	I.	71,114
Staten Island Rap. Tr.....	912,419	855,490	I.	56,929
Net.....	268,360	237,677	I.	30,683
Summit Branch.....	1,442,671	1,358,815	I.	83,856
Net.....	203,691	132,929	I.	70,762
Lykens Valley.....	1,012,212	811,067	I.	201,145
Net.....	def. 15,020	def. 101,242	I.	116,262</